

Project Manual and Specifications

**The Seed Academy – Lake Cumberland
Regional AgriTech Center
Russell Springs, Kentucky**

for the

**Russell Co. Industrial Development Authority
Jamestown, Kentucky**

**MSE Project Number:
2078-34**

**November 2022
Revised May 2023**



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Russell Co. Industrial Development Authority

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SECTION 00020 - ADVERTISEMENT FOR BIDS
Russell Co. Industrial Development Authority
Russell Co. Agri-Tech Center Project
Jamestown, Russell Co., Kentucky

Sealed bids for the construction of the approximately and all work shown in the contract documents will be received on behalf of the Seed Academy Lake Cumberland Regional AgriTech Center for the Russell Co. Industrial Development Authority, Jamestown, KY, will be received in the DUO Broadband Headquarters, 2150 S. Main St., Jamestown, KY 42629, (270) 343-3131, until 2:00 P.M., Central time, June 20th, 2023 and then at said office will be publicly opened and read aloud at the 2:00 P.M., Central time, June 20th, 2023. Faxed or electronic bids will not be accepted.

The CONTRACT DOCUMENTS may be reviewed at the following locations:

MSE Web Site: mselex.com under Bid Opportunities.

Copies of the Contract Documents may be obtained at the office of Lynn Imaging, 328 E. Vine St., Lexington, KY 40507, (859) 226-5850 upon receipt of a check made payable to Lynn Imaging in the amount of \$200.00 (non-refundable) or as determined by Lynn Imaging. All orders must be prepaid. There will be a 24-hour turn-around on all orders.

A certified check or bank draft, payable to Russell Co. Industrial Development Authority, government bonds, or a satisfactory bid bond executed by the bidder and acceptable sureties in an amount equal to five percent of the bid shall be submitted with bid. The successful bidder will be required to furnish and pay for the following: 1) 5% Bid Bond; and 2) A performance and payment bond for 100% of the contract price.

Attention of bidders is particularly called to the requirements as to conditions of employment to be observed and minimum wage rates to be paid under the contract, Section 3, Segregated Facility, Section 109 and E.O. 11246 and Title VI and other requirements. Minority bidders are encouraged to bid.

The Owner may consider informal any bid not prepared and submitted in accordance with the provisions of this advertisement and/or the specifications and may waive any informalities or reject any and all Bids. Any proposal received after the time and date specified shall not be considered and will be returned unopened to the proposer. The owner reserves the right to waive any informalities or to reject any or all bids.

Sealed bid should be labeled "The Seed Academy AgriTech Center Project".

Federal Wage Rates **DO** apply to this project.

No Bidder may withdraw his Bid for a period of sixty (60) days after the actual date of the opening thereof.

Award will be made to the lowest, responsive, responsible bidder. Bidding is for the sole benefit of the Russell Co. Industrial Development Authority. The Russell County Industrial Development Authority is an Equal Employment Opportunity Employer.

End of Section



AIA[®] Document A701[™] – 2018

Instructions to Bidders

for the following Project:

(Name, location, and detailed description)

THE OWNER:

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

THE ARCHITECT:

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

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

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

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

ARTICLE 1 DEFINITIONS

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

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

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

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

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

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

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

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

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

ARTICLE 2 BIDDER'S REPRESENTATIONS

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

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

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

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

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

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

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

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

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

§ 3.2 Modification or Interpretation of Bidding Documents

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

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect at least seven days prior to the date for receipt of Bids.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)

§ 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.)

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

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

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

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

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

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

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

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

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

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

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

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

§ 4.2 Bid Security

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

(Insert the form and amount of bid security.)

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

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

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

§ 4.3 Submission of Bids

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

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

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

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

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

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

§ 4.4 Modification or Withdrawal of Bid

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

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

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

(State the terms and conditions, such as Bid rank, for returning or retaining the bid security.)

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

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

§ 5.2 Rejection of Bids

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

§ 5.3 Acceptance of Bid (Award)

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

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

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

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

§ 6.2 Owner's Financial Capability

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

§ 6.3 Submittals

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

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

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

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

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

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

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

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

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

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

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

§ 7.2 Time of Delivery and Form of Bonds

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

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

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

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

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

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

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)
- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)
- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)
- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013.)

.5 Drawings

Number	Title	Date
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.6 Specifications

Section	Title	Date	Pages
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.7 Addenda:

Number	Date	Pages
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.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.)

SECTION 00100 - INSTRUCTIONS TO BIDDERS
ADDITIONAL INFORMATION

PART 1 - GENERAL

1.01 DEFINITIONS

- A. AIA Document A701/2018, Instructions to Bidders, Articles 1 through 8, inclusive, and Guide 27 Attachment 2 are a part of this Contract.
- B. General Conditions of the Contract for Construction, AIA Document A201/2017 or current edition, Articles 1 through 14 inclusive, are a part of this Contract.

1.02 BIDDING DOCUMENTS

- A. The Bidding Documents are the Bidding and Contract Requirements, the Specifications, the Drawings and any addenda issued prior to receipt of bids.
- B. Documents are on file and may be examined or obtained for bidding purposes as stated in Section 00020 - Advertisement for Bids.

1.03 SUBSTITUTIONS AND APPROVALS DURING BIDDING

- A. Whenever products or materials are specified as "Standards" or they are otherwise named, approval of other equal quality products shall be obtained by requesting in writing and presenting for evaluation, such product or material, to the Architect, no later than seven (7) days prior to date set for receipt of bids. Submittals circumventing the above time frame will not be processed.
 - 1. If approval is granted, product or material will be added by Addendum.
 - 2. No direct reply will be made to any requests for changes, but any requested changes approved by the Architect will be stated in an Addendum issued to all prime-bidders.
 - 3. Issuance of Bidding Documents does not constitute approval of products, materials, or subcontractors.

1.04 ADDENDA

Article 3: Bidding Documents. 3.4 Addenda, 3.4.3. Change the four days to read as follows: Addenda will be issued by the Architect when in the opinion of the Architect the issuance of an addenda is in the interest of the bid process and the Owner.

1.05 BIDDER'S REPRESENTATION

- A. Each Bidder, by making his bid, represents that he has read and understands the bidding documents.

- B. Each Bidder, by making his bid, represents that he has familiarized himself with the local conditions under which the Work is to be performed.
 - 1. No additional costs of any type will be allowed by the failure of the Bidder to avail himself of the privilege of a complete and thorough, on-site inspection.
- C. Each bidder must visit and inspect the site.

1.06 BID SECURITY

- A. Provide bid security in the form of Bid Bond, AIA Documents A310, for five percent (5%) of bid made payable to the Russell County Industrial Development Authority . This security shall be forfeited if the bidder is awarded the contract and subsequently fails to enter into a contract with and furnish the required contract bond to the OWNER within ten (10) days after notice of acceptance of his proposal is made.
- B. The bid security of all unsuccessful bidders will be returned promptly after an award has been made, or in the event that all bids are rejected. The bid security of the successful bidder will be returned when a satisfactory performance and labor and material payment bond has been furnished and the contract executed.

1.07 PREPARATION OF BIDS

- A. Bids shall be submitted in duplicate only on proposal bid form as included herein.
- B. Any interlineation, alteration, or erasure will be grounds for rejection of the Bid. Bids shall contain no recapitulation of the work to be done.
- C. Bids shall be based on the materials, construction, equipment and methods named or described in the specifications and on the drawings, and any addenda issued prior to receipt of bids.
- D. Proposals shall be sealed in an opaque envelope marked with the bidder's name and business address, and bearing the following caption:
 - 1. Proposal for:
The Seed Academy Lake Cumberland Regional Agritech Center Project
 - 2. Proposals shall be addressed and delivered to:
Russell Co. Industrial Development Authority
2150 N Main St.
Jamestown, KY 42629

1.08 BID SUPPLEMENTS

- A. Bids shall be accompanied by the following supplemental documents, all properly signed and notarized:
 - 1. Bid Security, Bid Bond, AIA Document A310
 - 2. Document SC-1 - Subcontractors List (may use your own form)
 - 3. Non-Collusion Affidavit

1.09 SELECTION OF BIDS

- A. The Owner reserves the right to reject any and/or all bids and to waive any informality in bidding.

1.10 AWARD OF CONTRACTS

- A. Contracts shall be deemed to have been awarded when Notice of Award shall have been duly served upon the Bidder by any officer or agent of the Owner duly authorized to give such notice. Before the contract becomes valid, the Bidder must provide all necessary bonds, insurance and other information herein called for.

1.11 THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FURNISH THE FOLLOWING:

- A. A One Hundred Percent (100%) Performance/Payment Bond, in an amount equal to the total contract price. This bond shall guarantee all labor and materials to be as required, the faithful performance of the contract and the prompt and faithful payment of any claim or liens from any cause for which the Contractor is liable, including those for labor, materials, utility services, transportation costs and for supplies, equipment and machinery (or rental thereof).
- B. Such guarantee bonds shall remain in effect and full force for one (1) year after final acceptance of the work. Such bond shall not be executed as of a date prior to the executing of the contract.

1.12 DETAILED COST BREAKDOWN

- A. Upon award of contract, Contractor will have seven (7) working days to generate a finalized detailed cost breakdown and a detailed project schedule of the project. All construction draws made on the project will require updating the Contractor's cost breakdown. Architect and Owner approval will be required on all pay requests.

1.13 CONTRACTOR'S RESPONSIBILITY REGARDING SUB-CONTRACTORS

- A. It shall be prime contractor's responsibility to check all sub-bids carefully to determine whether or not any exceptions, omissions, or alterations to the drawings and specifications have been noted therein, as he is solely responsible for a complete job in strict accordance with drawings and specifications.

1.14 COMMENCING WORK

- A. Contractor shall commence work within ten (10) days after written Notice to Proceed is issued by the Owner, unless otherwise arranged by the Owner.

1.15 OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

- A. These construction documents are to be governed, at all times, by applicable provisions of the federal laws, including but not limited to the latest amendments of the following:
 - 1. William - Steiger Occupational Safety and Health Act of 1970, Public Law 91-596.
 - 2. Part 1910 - Occupational Safety and Health Standards, Chapter XVII of Title 29, Code of Federal Regulations.
- B. All prime contractors, sub-contractors and their employees shall be solely responsible to conduct their work in conformance with the regulations contained in this act and as amended. All material suppliers and manufacturers shall be fully aware of their responsibilities and the requirements of the finished project under the regulations of this Act, and as amended. Such materials and fabricated products incorporated in this project shall, at the time of installation or application, be in conformance with the regulations of this act, and as amended.

END OF SECTION

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

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

ARTICLE 2, BIDDER'S REPRESENTATIONS

2.1 Add the following subparagraph to paragraph 2.1:

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

ARTICLE 4, BIDDING PROCEDURES

4.1.1 Add the following sentence to subparagraph 4.1.1:

Only one copy of the Bid is to be submitted.

4.2.1 Delete subparagraph 4.2.1 and substitute the following:

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

4.3 Add the following subparagraphs to paragraph 4.3:

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

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

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

4.3.9 The Bidder agrees to abide by the requirements under 7 C.F.R. part 180, which pertains to the debarment or suspension of a person from participating in a Federal program or activity. Each Bid exceeding \$25,000 shall be accompanied by a relevant completed certification form identical to that included in the Bidding Documents.

4.4.3 Delete subparagraph 4.4.3 and substitute the following subparagraphs 4.4.3 and .1:

4.4.3 No Bidder may withdraw, modify or cancel a Bid within 60 calendar days after the actual date of the opening thereof. Should there be reasons why the Contract cannot be awarded within the specified period, the time may be extended, by mutual agreement between the Owner and the Bidder, and the concurrence of the Agency.

4.4.3.1 In the event the lowest responsive bidder requests to withdraw its bid after a bid opening due to an unintentional error in its contents, the Owner may waive informalities, accept the request, and keep the bid security provided by the Bidder.

ARTICLE 5, CONSIDERATION OF BIDS

5.3.2 Delete subparagraph 5.3.2 and substitute the following:

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

ARTICLE 7, PERFORMANCE BOND AND PAYMENT BOND

7.1.1 Replace this subparagraph with the following:

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

7.1.3 Delete subparagraph 7.1.3 and substitute the following:

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

7.2.1 Delete subparagraph 7.2.1 and substitute the following:

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

7.2.2 Delete subparagraph 7.2.2 and substitute the following:

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

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

o0o

(00-00-00) PN 000

SECTION 00310 - BID SCHEDULE

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

to the Russell Co. Industrial Development Authority (hereinafter called "OWNER").

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all WORK for the Seed Academy Lake Cumberland Regional Agritech Center in strict accordance with the Contract Documents, within the time set forth and the prices stated below.

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

BIDDER hereby agrees to commence Work under this contract on or before a date to be specified in the Notice to Proceed and to substantially complete the Project within three hundred sixty-five (365) consecutive calendar days following the Notice to Proceed. BIDDER further agrees to pay as liquidated damages, the sum of \$1,000 for each consecutive calendar day thereafter as provided in the General Conditions and the Special Conditions.

BIDDER agrees to perform all the WORK described in the CONTRACT DOCUMENTS for the lump sum contained in the following Bid Schedule.

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

Item	Description	Unit	Cost of Item
1.	Architectural and Structural Items	LS	\$ _____
2.	Mechanical/Electrical Items	LS	\$ _____
3.	Special Inspections Testing Service (Allowance)	LS	\$ <u>30,000</u>
4.	All Other Miscellaneous Costs	LS	\$ _____
TOTAL COST OF ITEMS 1 - 4			\$ _____
5.	Deductive Alternate #1 – Deduct Lab 119 & Lab 122 and associated spaces in their entirety. Refer to Specification 01230 Alternates and Drawings.	LS	\$ _____
6.	Deductive Alternate #2 – Provide deduct to replace light fixture N1 in corridors 124 & 111 with light fixture H1.	LS	\$ _____
7.	Deductive Alternate #3 – Deduct clerestory walls, structure, roof, and windows from PEMB. Finish roof and structure with continuous ridge.	LS	\$ _____
8.	Deductive Alternate #4 – deduct parking lot & driveways south of line shown on Civil sheets. Grading & storm drainage to remain as shown.	LS	\$ _____

The bid prices shall include all labor, materials, taxes, allowances, overhead, profit, insurance, and other costs necessary to install the finished work of the several items called for. Changes shall be processed in accordance with the General Conditions.

This is an invitation for offer to bid, not an offer to enter into a contract.

Accompanying this Proposal is a certified check or standard Bid Bond in the sum of _____ Dollars (\$ _____), in accordance with the Information for Bidders. The BIDDER, by submittal of this Bid, agrees with the OWNER that the amount of the bid security deposited with this Bid fairly and reasonably represents the amount of damages the OWNER will suffer due to the failure of the BIDDER to fulfill his agreements as provided in this Proposal.

Addenda to the Drawings and Specifications issued heretofore are hereby acknowledged by the undersigned as being:

No. _____ Date: _____ No. _____ Date: _____
No. _____ Date: _____ No. _____ Date: _____

BIDDER understands that the OWNER reserves the right to reject any or all Bids and to waive any informalities in the Bidding.

BIDDER agrees that this Bid shall be good and may not be withdrawn for a period of sixty (60) calendar days after the actual date of bid opening.

Within ten (10) calendar days after receiving written notice of the acceptance of this Bid by the OWNER, the Bidder will execute and deliver to the OWNER four (4) copies of the Agreement and such other required Contract Documents.

Attachments:

- a. (add Subcontractors List (may use your own form)).
- b. Bid Security
- c. 00480 Non-Collusion Affidavit)
- d. If the contract bids exceeds \$10,000, a bidder must submit Form RD 400-6 "Compliance Statement," with the bid. "Equal Opportunity Clause," will be a part of all construction contracts exceeding \$10,000.
- e. If the contract bid exceeds \$25,000, a bidder must submit For AD 1048 "Debarment, Suspension . . . Lower Tier Transaction," with the bid.
- f. If the contract bid exceeds \$100,000, a bidder must submit RD 1940Q, Exhibit A-1, "Certification for Contracts, Grants, and Loans," with the bid.

BIDDER: _____
(Name of Company or Partnership)

By: _____
(Signature) (Date)

(Print Name) (Title)

(Street Address/P.O. Box) (Phone Number)

(City, State, Zip)

(Email Address)

Attested By: _____
(Signature) (Date)

Seal (If bid is by a corporation)

END OF SECTION

SECTION 00410 - BID SECURITY FORM

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Bid security for this project shall be in the form of a Bid Bond executed on AIA Document A310-1970 or 2010 form in the amount of five percent (5%) of the bid, made payable to the Owner.
- 1. The bid security of all unsuccessful bidders will be returned promptly after an award has been made or in the event that all bids are rejected. The bid security of the successful bidder will be returned when satisfactory performance and labor and material payment bonds (AIA Document A312) have been furnished and contract executed, including one year warranty period.

END OF SECTION

SECTION 00480 - NON-COLLUSION AFFIDAVIT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Non-Collusion Affidavit for the project shall be submitted with the bid proposal, and a copy of this document is bound herewith.
 - 1. When properly executed, this Document shall become a part of the successful bidder's Contract Document.

END OF SECTION

NON-COLLUSION AFFIDAVIT

The undersigned bidder, on behalf of its officers and agents or representatives being duly sworn, states that it has not in any way, directly or indirectly, entered into any arrangement or agreement with any other bidder, or with any other person or public officer whereby bidder has paid or is to pay to such other bidder or other person or public officer any sum or money, or has given or is to give to such other bidder or other person or public officer anything of value whatever, or such affiant or either of them has not, directly or indirectly, entered into any arrangement or agreement with any other bidder or bidders, which tends to or does lessen or destroy free competition in the letting of the contract sought for by the attached bids; that no inducement of any form or character other than that which appears upon the face of the bid will be suggested, offered, paid or delivered to any person whomsoever to influence the acceptance of the said bid or awarding of the contract, nor has this bidder any agreement or understanding of any kind whatsoever, with any person whomsoever to pay, deliver to, or share with any other person in any way or manner, any of the proceeds of the contract sought by this bid.

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

My Commission expires:

Notary Public

END OF AFFIDAVIT

SECTION 00490 - NOTICE OF AWARD

To: _____

Project Description: The Seed Academy Lake Cumberland Regional Agritech Center

The Owner has considered the Bid submitted by you for the above, described Work in response to its Advertisement for Bids dated _____, and Information for Bidders.

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

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

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

You are required to return an acknowledged copy of this Notice of Award to the Owner.

Dated this _____ day of _____, 20__.

Russell Co. IDA

Owner

By _____

Name/Title Clint Voils, Chairman

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged by _____,

this the _____ day of _____, 20__.

By _____

Name/Title _____

SECTION 00500 - AGREEMENT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The contract Agreement for this project shall be AIA Document A101, Owner - Contractor Agreement Form - Stipulated Sum, 2017 edition and Guide 27 Attachment 3.
- B. This form, when fully executed, shall become a part of the successful bidder's Contract Documents.

END OF SECTION

DRAFT AIA® Document A101® – 2017

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

AGREEMENT made as of the « » day of « » in the year « 2023 »
(In words, indicate day, month and year.)

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

Russell County Industrial Development Authority
2150 North Main Street
Jamestown, KY 42629

« »

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

TBD

« »

« »

« »

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

The Seed Academy Lake Cumberland Regional Agritech Center
Site: 531 French Valley Rd, Russell Springs, KY 42642

« »

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

MSE of Kentucky
624 Wellington Way
Lexington, KY 40503

« »

The Owner and Contractor agree as follows.

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

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

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

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

TABLE OF ARTICLES

1	THE CONTRACT DOCUMENTS
2	THE WORK OF THIS CONTRACT
3	DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
4	CONTRACT SUM
5	PAYMENTS
6	DISPUTE RESOLUTION
7	TERMINATION OR SUSPENSION
8	MISCELLANEOUS PROVISIONS
9	ENUMERATION OF CONTRACT DOCUMENTS

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

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

ARTICLE 2 THE WORK OF THIS CONTRACT

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

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:

(Check one of the following boxes.)

☒ The date of this Agreement.

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

☐ Established as follows:

(Insert a date or a means to determine the date of commencement of the Work.)

« »

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

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

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

(Check one of the following boxes and complete the necessary information.)

[« »] Not later than « » (« 365 ») 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.)

« \$1,000 a day »

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

« »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

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

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

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « » day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the « » day of the « » month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than « » (« ») days after the Architect receives the Application for Payment.

(Federal, state or local laws may require payment within a certain period of time.)

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

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

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

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

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

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

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

§ 5.1.7 Retainage

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

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

« 10% through 50% project completion, reduced to 5% after 51% through 100% project completion »

§ 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, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

<< >> % << >>

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

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§ 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.)

☒ [**X**] 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)

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<< >>

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§ 8.3 The Contractor’s representative:

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

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

§ 8.5 Insurance and Bonds

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

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

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

« »

§ 8.7 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor
- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds
- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction
- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:

(Insert the date of the E203-2013 incorporated into this Agreement.)

« »

- .5 Drawings

Number	Title	Date

- .6 Specifications

Section	Title	Date	Pages

- .7 Addenda, if any:

Number	Date	Pages

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

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

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

« »

[« »] The Sustainability Plan:

Title	Date	Pages

[« »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents, if any, listed below:

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

« »

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

OWNER (Signature)

« »« »

(Printed name and title)

CONTRACTOR (Signature)

« »« »

(Printed name and title)

DRAFT AIA® Document A101® – 2017

Exhibit A

Insurance and Bonds

This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Contractor, dated the « » day of « » in the year « 2023 »
(In words, indicate day, month and year.)

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

The Seed Academy Lake Cumberland Regional Agritech Center
Site: 531 French Valley Rd, Russell Springs, KY 42642

« »

THE OWNER:
(Name, legal status and address)

Russell County Industrial Development Authority
2150 North Main Street
Jamestown, KY 42629

« »

THE CONTRACTOR:
(Name, legal status and address)

TBD

« »

TABLE OF ARTICLES

- A.1 GENERAL
- A.2 OWNER'S INSURANCE
- A.3 CONTRACTOR'S INSURANCE AND BONDS
- A.4 SPECIAL TERMS AND CONDITIONS

ARTICLE A.1 GENERAL

The Owner and Contractor shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to AIA Document A201™-2017, General Conditions of the Contract for Construction.

ARTICLE A.2 OWNER'S INSURANCE

§ A.2.1 General

Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Article A.2 and, upon the Contractor's request, provide a copy of the property insurance policy or policies required by Section A.2.3. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

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

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

This document is intended to be used in conjunction with AIA Document A201®-2017, General Conditions of the Contract for Construction. Article 11 of A201®-2017 contains additional insurance provisions.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

§ A.2.2 Liability Insurance

The Owner shall be responsible for purchasing and maintaining the Owner's usual general liability insurance.

§ A.2.3 Required Property Insurance

§ A.2.3.1 Unless this obligation is placed on the Contractor pursuant to Section A.3.3.2.1, the Owner shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The Owner's property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed and materials or equipment supplied by others. The property insurance shall be maintained until Substantial Completion and thereafter as provided in Section A.2.3.1.3, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.

§ A.2.3.1.1 **Causes of Loss.** The insurance required by this Section A.2.3.1 shall provide coverage for direct physical loss or damage, and shall not exclude the risks of fire, explosion, theft, vandalism, malicious mischief, collapse, earthquake, flood, or windstorm. The insurance shall also provide coverage for ensuing loss or resulting damage from error, omission, or deficiency in construction methods, design, specifications, workmanship, or materials. Sub-limits, if any, are as follows:

(Indicate below the cause of loss and any applicable sub-limit.)

Causes of Loss	Sub-Limit

§ A.2.3.1.2 **Specific Required Coverages.** The insurance required by this Section A.2.3.1 shall provide coverage for loss or damage to falsework and other temporary structures, and to building systems from testing and startup. The insurance shall also cover debris removal, including demolition occasioned by enforcement of any applicable legal requirements, and reasonable compensation for the Architect's and Contractor's services and expenses required as a result of such insured loss, including claim preparation expenses. Sub-limits, if any, are as follows:

(Indicate below type of coverage and any applicable sub-limit for specific required coverages.)

Coverage	Sub-Limit

§ A.2.3.1.3 Unless the parties agree otherwise, upon Substantial Completion, the Owner shall continue the insurance required by Section A.2.3.1 or, if necessary, replace the insurance policy required under Section A.2.3.1 with property insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 12.2.2 of the General Conditions.

§ A.2.3.1.4 **Deductibles and Self-Insured Retentions.** If the insurance required by this Section A.2.3 is subject to deductibles or self-insured retentions, the Owner shall be responsible for all loss not covered because of such deductibles or retentions.

§ A.2.3.2 **Occupancy or Use Prior to Substantial Completion.** The Owner's occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section A.2.3.1 have consented in writing to the continuance of coverage. The Owner and the Contractor shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

§ A.2.3.3 Insurance for Existing Structures

If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Owner shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, "all-risks" property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage from the causes of loss identified in Section A.2.3.1, notwithstanding the undertaking of the Work. The Owner shall be responsible for all co-insurance penalties.

§ A.2.4 Optional Extended Property Insurance.

The Owner shall purchase and maintain the insurance selected and described below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. For each type of insurance selected, indicate applicable limits of coverage or other conditions in the fill point below the selected item.)

- [☐] **§ A.2.4.1 Loss of Use, Business Interruption, and Delay in Completion Insurance**, to reimburse the Owner for loss of use of the Owner's property, or the inability to conduct normal operations due to a covered cause of loss.

☐ ☐

- [☐] **§ A.2.4.2 Ordinance or Law Insurance**, for the reasonable and necessary costs to satisfy the minimum requirements of the enforcement of any law or ordinance regulating the demolition, construction, repair, replacement or use of the Project.

☐ ☐

- [☐] **§ A.2.4.3 Expediting Cost Insurance**, for the reasonable and necessary costs for the temporary repair of damage to insured property, and to expedite the permanent repair or replacement of the damaged property.

☐ ☐

- [☐] **§ A.2.4.4 Extra Expense Insurance**, to provide reimbursement of the reasonable and necessary excess costs incurred during the period of restoration or repair of the damaged property that are over and above the total costs that would normally have been incurred during the same period of time had no loss or damage occurred.

☐ ☐

- [☐] **§ A.2.4.5 Civil Authority Insurance**, for losses or costs arising from an order of a civil authority prohibiting access to the Project, provided such order is the direct result of physical damage covered under the required property insurance.

☐ ☐

- [☐] **§ A.2.4.6 Ingress/Egress Insurance**, for loss due to the necessary interruption of the insured's business due to physical prevention of ingress to, or egress from, the Project as a direct result of physical damage.

☐ ☐

- [☐] **§ A.2.4.7 Soft Costs Insurance**, to reimburse the Owner for costs due to the delay of completion of the Work, arising out of physical loss or damage covered by the required property insurance: including construction loan fees; leasing and marketing expenses; additional fees, including those of architects, engineers, consultants, attorneys and accountants, needed for the completion of the construction, repairs, or reconstruction; and carrying costs such as property taxes, building permits, additional interest on loans, realty taxes, and insurance premiums over and above normal expenses.

☐ ☐

§ A.2.5 Other Optional Insurance.

The Owner shall purchase and maintain the insurance selected below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance.)

[☐] § **A.2.5.1 Cyber Security Insurance** for loss to the Owner due to data security and privacy breach, including costs of investigating a potential or actual breach of confidential or private information.
(Indicate applicable limits of coverage or other conditions in the fill point below.)

« »

[☐] § **A.2.5.2 Other Insurance**
(List below any other insurance coverage to be provided by the Owner and any applicable limits.)

Coverage

Limits

ARTICLE A.3 CONTRACTOR'S INSURANCE AND BONDS

§ A.3.1 General

§ **A.3.1.1 Certificates of Insurance.** The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article A.3 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of commercial liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy or policies.

§ **A.3.1.2 Deductibles and Self-Insured Retentions.** The Contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Contractor.

§ **A.3.1.3 Additional Insured Obligations.** To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage to include (1) the Owner, the Architect, and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's consultants, CG 20 32 07 04.

§ A.3.2 Contractor's Required Insurance Coverage

§ **A.3.2.1** The Contractor shall purchase and maintain the following types and limits of insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

(If the Contractor is required to maintain insurance for a duration other than the expiration of the period for correction of Work, state the duration.)

« »

§ A.3.2.2 Commercial General Liability

§ **A.3.2.2.1** Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than « » (\$ «1,000,000 ») each occurrence, « » (\$ «2,000,000 ») general aggregate, and « » (\$ «2,000,000 ») aggregate for products-completed operations hazard, providing coverage for claims including

- .1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;
- .2 personal injury and advertising injury;

- .3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;
- .4 bodily injury or property damage arising out of completed operations; and
- .5 the Contractor's indemnity obligations under Section 3.18 of the General Conditions.

§ A.3.2.2.2 The Contractor's Commercial General Liability policy under this Section A.3.2.2 shall not contain an exclusion or restriction of coverage for the following:

- .1 Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim.
- .2 Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.
- .3 Claims for bodily injury other than to employees of the insured.
- .4 Claims for indemnity under Section 3.18 of the General Conditions arising out of injury to employees of the insured.
- .5 Claims or loss excluded under a prior work endorsement or other similar exclusionary language.
- .6 Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.
- .7 Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.
- .8 Claims related to roofing, if the Work involves roofing.
- .9 Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings or surfaces, if the Work involves such coatings or surfaces.
- .10 Claims related to earth subsidence or movement, where the Work involves such hazards.
- .11 Claims related to explosion, collapse and underground hazards, where the Work involves such hazards.

§ A.3.2.3 Automobile Liability covering vehicles owned, and non-owned vehicles used, by the Contractor, with policy limits of not less than « » (\$ «1,000,000 ») per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance and use of those motor vehicles along with any other statutorily required automobile coverage.

§ A.3.2.4 The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as the coverages required under Section A.3.2.2 and A.3.2.3, and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ A.3.2.5 Workers' Compensation at statutory limits.

§ A.3.2.6 Employers' Liability with policy limits not less than « » (\$ « ») each accident, « » (\$ « ») each employee, and « » (\$ « ») policy limit.

§ A.3.2.7 Jones Act, and the Longshore & Harbor Workers' Compensation Act, as required, if the Work involves hazards arising from work on or near navigable waterways, including vessels and docks

§ A.3.2.8 If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate.

§ A.3.2.9 If the Work involves the transport, dissemination, use, or release of pollutants, the Contractor shall procure Pollution Liability insurance, with policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate.

§ A.3.2.10 Coverage under Sections A.3.2.8 and A.3.2.9 may be procured through a Combined Professional Liability and Pollution Liability insurance policy, with combined policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate.

§ A.3.2.11 Insurance for maritime liability risks associated with the operation of a vessel, if the Work requires such activities, with policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate.

§ A.3.2.12 Insurance for the use or operation of manned or unmanned aircraft, if the Work requires such activities, with policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate.

§ A.3.3 Contractor's Other Insurance Coverage

§ A.3.3.1 Insurance selected and described in this Section A.3.3 shall be purchased from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

(If the Contractor is required to maintain any of the types of insurance selected below for a duration other than the expiration of the period for correction of Work, state the duration.)

« »

§ A.3.3.2 The Contractor shall purchase and maintain the following types and limits of insurance in accordance with Section A.3.3.1.

(Select the types of insurance the Contractor is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. Where policy limits are provided, include the policy limit in the appropriate fill point.)

- [« »] § A.3.3.2.1 Property insurance of the same type and scope satisfying the requirements identified in Section A.2.3, which, if selected in this section A.3.3.2.1, relieves the Owner of the responsibility to purchase and maintain such insurance except insurance required by Section A.2.3.1.3 and Section A.2.3.3. The Contractor shall comply with all obligations of the Owner under Section A.2.3 except to the extent provided below. The Contractor shall disclose to the Owner the amount of any deductible, and the Owner shall be responsible for losses within the deductible. Upon request, the Contractor shall provide the Owner with a copy of the property insurance policy or policies required. The Owner shall adjust and settle the loss with the insurer and be the trustee of the proceeds of the property insurance in accordance with Article 11 of the General Conditions unless otherwise set forth below:

(Where the Contractor's obligation to provide property insurance differs from the Owner's obligations as described under Section A.2.3, indicate such differences in the space below. Additionally, if a party other than the Owner will be responsible for adjusting and settling a loss with the insurer and acting as the trustee of the proceeds of property insurance in accordance with Article 11 of the General Conditions, indicate the responsible party below.)

« »

- [« »] § A.3.3.2.2 Railroad Protective Liability Insurance, with policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate, for Work within fifty (50) feet of railroad property.

- [« »] § A.3.3.2.3 Asbestos Abatement Liability Insurance, with policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate, for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos-containing materials.

- [« »] § A.3.3.2.4 Insurance for physical damage to property while it is in storage and in transit to the construction site on an "all-risks" completed value form.

- [« »] § A.3.3.2.5 Property insurance on an "all-risks" completed value form, covering property owned by the Contractor and used on the Project, including scaffolding and other equipment.

- [« »] § A.3.3.2.6 Other Insurance

(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)

Coverage**Limits****§ A.3.4 Performance Bond and Payment Bond**

The Contractor shall provide surety bonds, from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located, as follows:

(Specify type and penal sum of bonds.)

Type

Penal Sum (\$0.00)

Payment Bond

100%

Performance Bond

100%

Payment and Performance Bonds shall be AIA Document A312™, Payment Bond and Performance Bond, or contain provisions identical to AIA Document A312™, current as of the date of this Agreement.

ARTICLE A.4 SPECIAL TERMS AND CONDITIONS

Special terms and conditions that modify this Insurance and Bonds Exhibit, if any, are as follows:

« »

ATTACHMENT TO AIA DOCUMENT A101-2017, *Standard Form of Agreement
Between Owner and Contractor*

The provisions of this Attachment shall delete, modify and supplement the provisions contained in the "*Standard Form of Agreement Between Owner and Contractor*," AIA Document A101-2017 Edition. The provisions contained in this attachment shall supersede any conflicting provisions of the AIA Document.

ARTICLE 3, DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

Delete paragraph 3.1 and substitute the following:

3.1 The date of commencement shall be contained in the Notice to Proceed.

Replace paragraph 3.3.3 with the following:

If the work is not substantially complete on or before this date, or within this period of time, or extension thereof granted by the Owner, damage will be sustained by the Owner and that it is and will be impracticable and extremely difficult to fix the actual damage which the Owner will sustain in the event of and by reason of such delays. The Contractor shall pay to the Owner liquidated damages in the sum of \$ 1,000 for each calendar day of delay. Any sums that may be due the Owner as liquidated damages may be deducted from any monies due or to become due the Contractor under the Contract or may be collected from the Contractor's surety.

ARTICLE 5, PAYMENTS

Insert "ten" and "10" in the appropriate spaces in subparagraph 5.1.3.

Delete the following from clause 5.1.6.2:

(or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing)

Insert the following sentences in subparagraph 5.1.7.1:

The amount retained shall be 10% of the value of Work until 50% of the Work has been completed or a withholding of equal or greater value, such as, 5% for the full duration of the project. If 10% is held, at 50% completion, further partial payments shall be made in full to the Contractor and no additional amounts may be retained unless the Architect certifies that the Work is not proceeding satisfactorily, but amounts previously retained shall not be paid to the Contractor. At 50% completion or any time thereafter when the progress of the Work is not satisfactory, additional amounts may be retained, but in no event shall the total retainage be more than 10% of the value of Work completed.

ARTICLE 8, MISCELLANEOUS PROVISIONS

Add the following subparagraph to paragraph 8.7:

8.7.1 This Agreement shall not become effective until concurred in writing by the Agency. Such concurrence shall be evidenced by the signature of a duly authorized representative of the Agency in the space provided at the end of this Attachment to the Agreement. The concurrence so evidenced by the Agency shall in no way commit the Agency to render financial assistance to the Owner and is without liability to the Agency for any payment thereunder, but in the event such assistance is provided, the concurrence shall signify the provisions of this Agreement are consistent with Agency requirements.

ARTICLE 9, ENUMERATION OF CONTRACT DOCUMENTS

The following Documents should be referenced, if applicable:

Subparagraph 9.1.3:

Attachment to the *Standard Form of Agreement Between Owner and Contractor* (this Attachment)
General Conditions of the Contract for Construction, AIA A201-2017
Attachment to the *General Conditions of the Contract for Construction* (RD Instruction 1942-A, Guide 27, Attachment 4)
Special Conditions

Subparagraph 9.1.7:

Invitation for Bids (Form RD 1924-5)
Instructions to Bidders, AIA A701-1997
Attachment to the *Instructions to Bidders* (RD Instruction
1924-A, Guide 27, Attachment 2)
Bid Form
Bid Bond
Compliance Statement (Form RD 400-6)
Payment Bond
Performance Bond
Certification Regarding Debarment, Suspension,
Ineligibility and Voluntary Exclusion - Lower Tier
Covered Transactions (Form AD 1048)
Disclosure of Lobbying Activities (SF-LLL)
Certification for Contracts, Grants and Loans (RD
Instruction 1940-Q, Exhibit A-1)

Delete the signature block on page 7 of this Agreement, and substitute
the block on the following page:

RD Instruction 1942-A
Guide 27
Attachment 3
Page 4

IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, this Agreement in duplicate on the respective dates indicated below:

ATTEST: _____	OWNER: By _____
Type Name _____	Type Name _____
Title _____	Title _____
Date _____	Date _____

ATTEST: _____	CONTRACTOR: By _____
Type Name _____	Type Name _____
Title _____	Title _____
Date _____	Date _____

AGENCY CONCURRENCE:

By _____
Type Name _____
Title _____
Date _____

The concurrence so evidenced by the Agency shall in no way commit the Agency to render financial assistance to the Owner and is without liability to the Agency for any payment hereunder, but in the event such assistance is provided, the concurrence shall signify the provisions of this Agreement are consistent with Agency requirements.

o0o

SECTION 00610 - PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

PART 1 - GENERAL

1.01 DESCRIPTION

- A. A performance bond for 100% of the final contract amount shall be executed in favor of the Owner; the forms for this bond shall be AIA Document A 312, "Performance Bond", 2010 edition.
- B. A Payment Bond on part of the contractor for 100% of the contract price as it may be increased, the forms for this bond shall be, AIA Document A312, "Payment Bond", 2010 edition.
- C. Consent of Surety to Reduction in or Partial Release of Retainage: AIA Document G707A, 1994 Edition.
- D. Consent of Surety to Final Payment: AIA Document G707, 1994 Edition.
- E. Furnish the required bonds within ten (10) days of receipt of Notice of Award.
- F. When fully executed, these bonds shall become part of the successful bidder's Contract Documents.

END OF SECTION

COMPLIANCE STATEMENT

This statement relates to a proposed contract with Russell Co. Industrial Dev. Authority

(Name of borrower or grantee)

who expects to finance the contract with assistance from either the Rural Housing Service (RHS), Rural Business-Cooperative Service (RBS), or the Rural Utilities Service (RUS) or their successor agencies, United States Department of Agriculture (whether by a loan, grant, loan insurance, guarantee, or other form of financial assistance). I am the undersigned bidder or prospective contractor, I represent that:

1. I ☐ have ☐ have not, participated in a previous contract or subcontract subject to Executive 11246 (regarding equal employment opportunity) or a preceding similar Executive Order.
2. If I have participated in such a contract or subcontract, I ☐ have, ☐ have not, filed all compliance reports that have been required to file in connection with the contract or subcontract.
☐ If the proposed contract is for \$50,000 or more: or ☐ if the proposed nonconstruction contract is for \$50,000 or more and I have 50 or more employees, I also represent that:
3. I ☐ have, ☐ have not previously had contracts subject to the written affirmative action programs requirements of the Secretary of Labor.
4. If I have participated in such a contract or subcontract, ☐ I have, ☐ have not developed and placed on file at each establishment affirmative action programs as required by the rules and regulations of the Secretary of Labor.

I understand that if I have failed to file any compliance reports that have been required of me, I am not eligible and will not be eligible to have my bid considered or to enter into the proposed contract unless and until I make an arrangement regarding such reports that is satisfactory to either the RHS, RBS or RUS, or to the office where the reports are required to be filed.

I also certify that I do not maintain or provide for my employees any segregated facilities at any of my establishments, and that I do not permit my employees to perform their services at any location, under my control, where segregated facilities are maintained. I certify further that I will not maintain or provide for my employees any segregated facilities at any of my establishments, and that I will not permit my employees to perform their services at any location, under my control, where segregated facilities are maintained. I agree that a breach of this certification is a violation of the Equal Opportunity clause in my contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and wash rooms, restaurants and other eating areas time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. I further agree that (except where I have obtained identical certifications for proposed subcontractors for specific time periods) I will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause; that I will retain such certifications in my files; and that I will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods):

A federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act unless that collection of information displays a currently valid OMB Control Number. The OMB Control Number for this information collection is 0575-0201. Public reporting for this collection of information is estimated to be approximately 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, completing and reviewing the collection of information. All responses to this collection of information are voluntary. However, in order to obtain or retain a benefit, the information in this form is required 7 CFR 1901-E. Rural Development has no plans to publish information collected under the provisions of this program. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to: Information Collection Clearance Officer, Rural Development Innovation Center, Regulations Management Division at ICRMTRRequests@usda.gov.

**NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENTS FOR
CERTIFICATIONS OF NON-SEGREGATED FACILITIES**

A certification of Nonsegregated Facilities, as required by the May 9, 1967, order (32F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted prior to the award of a subcontract exceeding \$ 10,000 which is not exempt from the provisions of the Equal Opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

Date _____

(Signature of Bidder or Prospective Contractor)

Address (including Zip Code)

CERTIFICATION FOR CONTRACTS, GRANTS AND LOANS

The undersigned certifies, to the best of his or her knowledge and belief, that:

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

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

3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including contracts, subcontracts, and subgrants under grants and loans) and that all subrecipients shall certify and disclose accordingly.

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

(name)

(date)

(title)

oOo



Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion Lower Tier Covered Transactions

AD-1048

The following statement is made in accordance with the Privacy Act of 1974 (5 U.S.C. § 552a, as amended). This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, and 2 C.F.R. §§ 180.300, 180.335, Participants' responsibilities. The regulations were amended and published on August 31, 2005, in 70 Fed. Reg. 51865-51880. Copies of the regulations may be obtained by contacting the Department of Agriculture agency offering the proposed covered transaction.

According to the Paperwork Reduction Act of 1995 an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0505-0027. The time required to complete this information collection is estimated to average 15 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. The provisions of appropriate criminal and civil fraud privacy, and other statutes may be applicable to the information provided.

(Read instructions on page two before completing certification.)

- A. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency;
- B. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

ORGANIZATION NAME	PR/AWARD NUMBER OR PROJECT NAME
NAME(S) AND TITLE(S) OF AUTHORIZED REPRESENTATIVE(S)	
SIGNATURE(S)	DATE

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotope, American Sign Language, etc.) should contact the responsible agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at [How to File a Program Discrimination Complaint \(https://www.ascr.usda.gov/filing-program-discrimination-complaint-usda-customer\)](https://www.ascr.usda.gov/filing-program-discrimination-complaint-usda-customer) and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442.

Instructions for Certification

- (1) By signing and submitting this form, the prospective lower tier participant is providing the certification set out on page 1 in accordance with these instructions.
- (2) The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension or debarment.
- (3) The prospective lower tier participant shall provide immediate written notice to the person(s) to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
- (4) The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of the rules implementing Executive Order 12549, at 2 C.F.R. Parts 180 and 417. You may contact the department or agency to which this proposal is being submitted for assistance in obtaining a copy of those regulations.
- (5) The prospective lower tier participant agrees by submitting this form that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.
- (6) The prospective lower tier participant further agrees by submitting this form that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
- (7) A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the System for Award Management (SAM) database.
- (8) Nothing contained in the foregoing shall be construed to require establishment of a system of records to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
- (9) Except for transactions authorized under paragraph (5) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

14. Certificate of Owner's Attorney.

I, the undersigned, _____, the duly authorized and
acting legal representative of _____
_____, do hereby certify as follows

I have examined the attached contract(s) and performance and payment
bond(s) and the manner of execution thereof, and I am of the opinion that each
of the aforesaid agreements are adequate and have has been duly executed by
the proper parties thereto acting through their duly authorized
representatives; that said representatives have full power and authority to
execute said agreements on behalf of the respective parties named thereon; and
that the foregoing agreements constitute valid and legally binding obligations
upon the parties executing the same in accordance with terms, conditions, and
provisions thereof.

Date: _____

NOTE: Delete phrase "performance and payment bonds" when not applicable.



AIA[®] Document A312[™] – 2010

Payment Bond

CONTRACTOR:

(Name, legal status and address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status and address)

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

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

CONSTRUCTION CONTRACT

Date:

Amount:

Description:

(Name and location)

BOND

Date:

(Not earlier than Construction Contract Date)

Amount:

Modifications to this Bond: ☐ None ☐ See Section 18

CONTRACTOR AS PRINCIPAL

Company: (Corporate Seal)

SURETY

Company: (Corporate Seal)

Signature: _____

Name
and Title:

(Any additional signatures appear on the last page of this Payment Bond.)

Signature: _____

Name
and Title:

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:

OWNER'S REPRESENTATIVE:

(Architect, Engineer or other party:)

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

- .1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
- .2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

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

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- .1 the name of the Claimant;
- .2 the name of the person for whom the labor was done, or materials or equipment furnished;
- .3 a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- .4 a brief description of the labor, materials or equipment furnished;
- .5 the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- .6 the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- .7 the total amount of previous payments received by the Claimant; and
- .8 the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

§ 16.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL

SURETY

Company:

(Corporate Seal)

Company:

(Corporate Seal)

Signature: _____

Name and Title: _____

Address _____

Signature: _____

Name and Title: _____

Address _____



AIA[®] Document A312[™] – 2010

Performance Bond

CONTRACTOR:

(Name, legal status and address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status and address)

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

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

CONSTRUCTION CONTRACT

Date:

Amount:

Description:

(Name and location)

BOND

Date:

(Not earlier than Construction Contract Date)

Amount:

Modifications to this Bond: ☐ None ☐ See Section 16

CONTRACTOR AS PRINCIPAL

Company: (Corporate Seal)

SURETY

Company: (Corporate Seal)

Signature: _____

Name

and Title:

(Any additional signatures appear on the last page of this Performance Bond.)

Signature: _____

Name

and Title:

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:

OWNER'S REPRESENTATIVE:

(Architect, Engineer or other party:)

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

- .1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;
- .2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
- .3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

- .1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
- .2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

- .1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
- .2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and
- .3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

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

§ 14 Definitions

§ 14.1 **Balance of the Contract Price.** The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 **Construction Contract.** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 **Contractor Default.** Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 **Owner Default.** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 **Contract Documents.** All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL

SURETY

Company:

(Corporate Seal)

Company:

(Corporate Seal)

Signature: _____

Name and Title: _____

Address _____

Signature: _____

Name and Title: _____

Address _____

Init.

SECTION 00650 - CERTIFICATES OF INSURANCE

PART 1 - GENERAL

1.01 GENERAL

- A. Certificates of Insurance shall be filed with the Owner prior to the commencement of any work. Insurance shall be purchased by the General Contractor.
 - 1. These certificates shall contain a provision that coverages afforded under the policies shall not be canceled or in any way terminated until at least thirty days prior written notice has been given to the Owner and Architect.
 - 2. The Owner and the Architect shall be specifically named as additional insureds on all insurance coverage for this project.
- B. Detailed insurance requirements are covered in Section 00500 Agreement attachment A101 Exhibit A Insurance and Bonds, and all certificates shall reflect these minimum requirements for the project.

END OF SECTION

SECTION 00680 - NOTICE TO PROCEED

TO: _____ Date: _____

Project: Russell Co. Agri-Science Center

You are hereby notified to commence WORK in accordance with the Agreement dated_____,
on or before_____, and you are to complete the WORK within _____ consecutive
calendar days thereafter. The date of completion of all WORK is therefore_____.

Russell Co. Industrial Development Authority

Owner

Signature

Clint Voils, Chairman

Name/Title

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by _____
_____this the_____day of_____, 20__.

Contractor

Signature

Name/Title



AIA[®] Document A201[™] – 2017

General Conditions of the Contract for Construction

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

THE OWNER:
(Name, legal status and address)

THE ARCHITECT:
(Name, legal status and address)

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

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

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

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

§ 1.1.2 The Contract

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

§ 1.1.3 The Work

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

§ 1.1.4 The Project

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

§ 1.1.5 The Drawings

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

§ 1.1.6 The Specifications

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

§ 1.1.7 Instruments of Service

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

§ 1.1.8 Initial Decision Maker

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

§ 1.2 Correlation and Intent of the Contract Documents

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

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining

provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

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

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

§ 1.3 Capitalization

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

§ 1.4 Interpretation

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

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

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

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

§ 1.6 Notice

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

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

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building

information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

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

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

§ 2.2 Evidence of the Owner's Financial Arrangements

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

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

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

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

§ 2.3 Information and Services Required of the Owner

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

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

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

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the

site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

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

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

§ 2.4 Owner's Right to Stop the Work

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

§ 2.5 Owner's Right to Carry Out the Work

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

ARTICLE 3 CONTRACTOR

§ 3.1 General

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

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

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

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

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

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's

capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

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

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

§ 3.3 Supervision and Construction Procedures

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

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

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

§ 3.4 Labor and Materials

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

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

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

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes

remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

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

§ 3.6 Taxes

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

§ 3.7 Permits, Fees, Notices and Compliance with Laws

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

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

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

§ 3.7.4 Concealed or Unknown Conditions

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

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

§ 3.8 Allowances

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

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

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

§ 3.9 Superintendent

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

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

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

§ 3.10 Contractor's Construction and Submittal Schedules

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

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

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

§ 3.11 Documents and Samples at the Site

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

§ 3.12 Shop Drawings, Product Data and Samples

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

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

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

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

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

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

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

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

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

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

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

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

time and in the form specified by the Architect.

§ 3.13 Use of Site

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

§ 3.14 Cutting and Patching

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

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

§ 3.15 Cleaning Up

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

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

§ 3.16 Access to Work

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

§ 3.17 Royalties, Patents and Copyrights

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

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

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

ARTICLE 4 ARCHITECT

§ 4.1 General

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

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

§ 4.2 Administration of the Contract

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

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

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

§ 4.2.4 Communications

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

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

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

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

Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

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

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

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

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

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

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

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

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

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

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

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

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

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

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the

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

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

§ 5.3 Subcontractual Relations

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

§ 5.4 Contingent Assignment of Subcontracts

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

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

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

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

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

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate

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

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

§ 6.2 Mutual Responsibility

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

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

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

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

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

§ 6.3 Owner's Right to Clean Up

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

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

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

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

§ 7.2 Change Orders

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

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

§ 7.3 Construction Change Directives

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

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

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

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

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

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

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

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

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

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

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The

Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

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

§ 7.4 Minor Changes in the Work

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

ARTICLE 8 TIME

§ 8.1 Definitions

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

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

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

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

§ 8.2 Progress and Completion

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

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

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

§ 8.3 Delays and Extensions of Time

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

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

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

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable

by the Owner to the Contractor for performance of the Work under the Contract Documents.

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

§ 9.2 Schedule of Values

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

§ 9.3 Applications for Payment

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

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

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

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

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

§ 9.4 Certificates for Payment

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

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The

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

§ 9.5 Decisions to Withhold Certification

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

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

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

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

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

§ 9.6 Progress Payments

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

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

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

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers

to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

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

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

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

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

§ 9.7 Failure of Payment

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

§ 9.8 Substantial Completion

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

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

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

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

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

§ 9.9 Partial Occupancy or Use

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

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

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

§ 9.10 Final Completion and Final Payment

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

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

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

constitute a waiver of Claims.

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

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

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

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

§ 10.2 Safety of Persons and Property

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

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

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

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

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

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

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

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

§ 10.2.8 Injury or Damage to Person or Property

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

§ 10.3 Hazardous Materials and Substances

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

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

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

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

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

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

§ 10.4 Emergencies

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the

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

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

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

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

§ 11.2 Owner's Insurance

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

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

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

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The

Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

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

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

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

§ 11.5 Adjustment and Settlement of Insured Loss

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

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

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

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

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

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

Contractor's expense.

§ 12.2.2 After Substantial Completion

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

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

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

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

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

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

§ 12.3 Acceptance of Nonconforming Work

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

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

§ 13.2 Successors and Assigns

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

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

§ 13.3 Rights and Remedies

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

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

§ 13.4 Tests and Inspections

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

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

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

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

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

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

§ 13.5 Interest

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

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

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

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

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

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

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

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

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

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

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

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

§ 14.3 Suspension by the Owner for Convenience

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

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

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

§ 14.4 Termination by the Owner for Convenience

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

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

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

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

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

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

§ 15.1.2 Time Limits on Claims

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

§ 15.1.3 Notice of Claims

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

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

§ 15.1.4 Continuing Contract Performance

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

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

§ 15.1.5 Claims for Additional Cost

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

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section

15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

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

§ 15.1.7 Waiver of Claims for Consequential Damages

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

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

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

§ 15.2 Initial Decision

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

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

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

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

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

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

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

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

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

§ 15.3 Mediation

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

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

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

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

§ 15.4 Arbitration

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

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

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

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly

consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

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

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

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

ATTACHMENT TO AIA DOCUMENT A201-2017, *General Conditions of the Contract for Construction*

The provisions of this attachment shall delete, modify and supplement the provisions contained in the "*General Conditions of the Contract for Construction*," AIA Document A201-2017 Edition. The provisions contained in this attachment will supersede any conflicting provisions of the AIA Document. The term "Agency," as used in this Attachment, shall mean the United States of America, acting through the United States Department of Agriculture.

ARTICLE 1, GENERAL PROVISIONS

Add the following subparagraph:

1.2.4 Concurrence of the Contract by the Agency is required before it is effective.

ARTICLE 2, OWNER

Delete subparagraph 2.3.6 and substitute the following:

2.3.6 The Contractor will be furnished, free of charge, _____ copies of the Drawings and Projects Manuals necessary for execution of the Work. Additional copies will be available from the Architect at the cost of reproduction and handling.

ARTICLE 4, ARCHITECT

Add the following to subparagraph 4.1.1:

The term "Architect" means the Architect, or the Engineer when the nature of the work is within the authority granted engineers by the State licensure law, or an authorized representative of the Architect or Engineer.

ARTICLE 5, SUBCONTRACTORS

Add the following to subparagraph 5.2.2:

The Contractor shall not contract with any party who is suspended or debarred by any Federal government agency from participating in Federally assisted construction projects.

ARTICLE 7, CHANGES IN THE WORK

Delete the words ", Construction Change Directive" from subparagraph 7.1.1.

Insert the words ", Agency " after the word "Owner," and delete the words "A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor" in subparagraph 7.1.2.

Delete the words "Construction Change Directive" from subparagraph 7.1.3.

Delete subparagraph 7.2.1 and substitute the following:

7.2.1 A Change Order is a written order to the Contractor utilizing Form RD 1924-7, "Contract Change Order," or AIA G-701 signed by the Owner, Architect, Contractor, and the Agency representative. It is issued after the execution of the Contract, authorizing a change in the Work or an adjustment in the Contract Sum or the Contract Time. The Contract Sum and the Contract Time may be changed only by Change Order. The Contractor's signing of a Change Order indicates complete agreement therein.

Add subparagraph 7.2.2:

7.2.2 Methods used in determining adjustments to the Contract Sum may include any of the following:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluating.
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon.

Add the following sentence to paragraph 7.3.1: "A Construction Change Directive may be used only for a change in response to an emergency as described in paragraph 10.4.

Delete subparagraph 7.3.2.

Add the following, where appropriate, to 7.3.3 through 7.3.10: "When the use of a Construction Change Directive is justified"

ARTICLE 8, TIME

Add the following subparagraphs:

8.2.4 The Notice to Proceed shall be issued within twenty (20) calendar days of the execution of the Agreement by the Owner. Should there be reasons why the Notice to Proceed cannot be issued within such period, the time may be extended by mutual agreement of the Owner and Contractor, with the concurrence of the Agency. If the Notice to Proceed has not been issued within the twenty (20) calendar day period or within the period mutually agreed, the Contractor may terminate the Agreement without further liability on the part of either party.

8.3.4 As outlined in Article 3 of the Agreement, the Contractor agrees to pay liquidated damages to the Owner for each calendar day the Contractor shall be in default.

ARTICLE 9, PAYMENTS AND COMPLETION

Delete clause 9.3.1.1 and substitute the following:

9.3.1.1 Work performed and materials supplied under a Change Order may be included for payment only after the Change Order has been approved by all appropriate parties, including the Agency.

Add the words ", using AIA Document 702, 'Application and Certificate for Payment' or Form RD 1924-18, 'Partial Payment Estimate'," after "Certificate for Payment" in subparagraph 9.4.1.

Add the following subparagraph:

9.6.9 No progress payments will be made that deplete the retainage, nor place in escrow any funds that are required for retainage, nor invest the retainage for the benefit of the Contractor. Retainage will not be adjusted until after construction is substantially complete.

Replace the word "seven" with the words "fifteen (15)" in the first sentence, second line of subparagraph 9.7.

Delete subparagraph 9.8.5, after the first sentence, and substitute the following:

9.8.5 When the Work has been substantially completed, except for Work which cannot be completed because of weather conditions, lack of materials or other reasons, which, in the judgment of the Owner, are valid reasons for non-completion, the Owner may make additional payments, retaining at all times an amount sufficient to cover the estimated cost of the Work still to be completed. Provide a copy of the Certificate to the Agency.

Delete subparagraphs 9.9.1 and add the following:

9.9.1 The Contractor agrees to the use and occupancy of a portion or unit of the Project before formal acceptance by the Owner under the following conditions:

- .1 A "Certificate of Substantial Completion" shall be prepared and executed as provided in subparagraph 9.8.4, except that when, in the opinion of the Architect, the Contractor is chargeable with unwarranted delay in completing the Work or other Contract requirements, the signature of the Contractor will not be required. The Certificate of Substantial Completion shall be accompanied by a written endorsement of the Contractor's insurance carrier and surety permitting occupancy by the Owner during the remaining period of the Project Work. Occupancy and use by the Owner shall not commence until authorized by public authorities having jurisdiction over the Work.
- .2 Occupancy by the Owner shall not be construed by the Contractor as being an acceptance of that part of the Project to be occupied.
- .3 The Contractor shall not be held responsible for any damage to the occupied part of the Project resulting from the Owner's occupancy.
- .4 Occupancy by the Owner shall not be deemed to constitute a waiver of existing claims in behalf of the Owner or Contractor against each other.
- .5 If the Project consists of more than one building, and one of the buildings is to be

occupied, the Owner, prior to occupancy of that building, shall secure permanent property insurance on the building to be occupied and necessary permits which may be required for use and occupancy.

Add to subparagraph 9.9.3: Use and occupancy by the Owner prior to Project acceptance does not relieve the Contractor of responsibility to maintain all insurance and bonds required of the Contractor under the Contract Documents until the Project is completed and accepted by the Owner.

ARTICLE 11, INSURANCE AND BONDS

Replace the words "the Contract Documents" with the words "subparagraph 11.1.1" in the first sentence of subparagraph 11.1.2.

Add the following subparagraph:

11.1.1. Insurance shall be:

- .1 Written with a limit of liability of not less than \$500,000 for all damages arising out of bodily injury, including death, at any time resulting therefrom, sustained by any one person in any one accident; and a limit of liability of not less than \$500,000 aggregate for any such damages sustained by two or more persons in any one accident. Insurance shall be written with a limit of liability of not less than \$200,000 for all property damage sustained by any one person in any one accident; and a limit of liability of not less than \$200,000 aggregate for any such damage sustained by two or more persons in any one accident, or
- .2 Written with a combined bodily injury and damage liability of not less than \$700,000 per occurrence; and with an aggregate of not less than \$700,000 per occurrence.

Add the following sentence to the end of subparagraph 11.3.1:

The provisions of this subparagraph shall apply to the Contractor if the Contractor purchases and maintains said insurance coverage.

Delete subparagraph 11.1.2 and substitute the following:

11.1.2 The Contractor shall furnish the Owner bonds covering faithful performance of the Contract and payment of obligations arising thereunder within ten (10) calendar days after receipt of the Notice of Award. The surety company executing the bonds must hold a certificate of authority as an acceptable surety on Federal bonds as listed in Treasury Circular 570, and be authorized to transact business in the State where the Project is located. The bonds (using the forms included in the Bidding Documents) shall each be equal to the amount of the Contract Sum. The cost of these bonds shall be included in the Contract Sum

Add the following subparagraphs:

11.1.3.1 The Contractor shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current power of attorney.

11.1.3.2 If at any time a surety on any such bond is declared bankrupt or loses its right to do business in the State in which the work is to be performed or is removed from the list of surety companies accepted on Federal Bonds, the Contractor shall within ten (10) calendar days after notice from the Owner to do so, substitute an acceptable bond in such form and sum and signed by such other surety or sureties as may be satisfactory to the Owner. The premiums of such bond shall be paid by any Contractor. No further payment shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable bond to the Owner.

ARTICLE 13, MISCELLANEOUS PROVISIONS

Add the following paragraphs:

13.6 LANDS AND RIGHTS-OF WAY

13.6.1 Prior to the start of construction, the Owner shall obtain all lands and rights-of-way necessary for the execution and completion of work to be performed under this contract.

13.7 EQUAL OPPORTUNITY REQUIREMENTS

Non-discrimination in Employment by Federally Assisted Construction Contractors, by Executive Order 11246.

13.7.1 This section summarizes Executive Order 11246, which prohibits employment discrimination and requires employers holding non-exempt Federal contracts and subcontracts and federally-assisted construction contracts and subcontracts in excess of \$10,000 to take affirmative action to ensure equal employment opportunity without regard to race, color, religion, sex, or national origin. The Executive Order requires, as a condition for the approval of any federally assisted construction contract, that the applicant incorporate nondiscrimination and affirmative action clauses into its non-exempt federally assisted construction contracts.

13.7.2 Executive Order 11246, is administered and enforced by the Office of Federal Contract Compliance Programs (OFCCP), an agency in the U.S. Department of Labor's Employment Standards Administration. OFCCP has issued regulations at 41 CFR chapter 60 implementing the Executive Order. The regulations at 41 CFR part 60-4 establish the procedures which the Agency, as an administering agency, must follow when making grants, contracts, loans, insurance or guarantees involving federally assisted construction which is not exempt from the requirements of Executive Order 11246. The regulations which apply to Federal or federally assisted construction contractors also are published at 41 CFR part 60-4.

13.7.3 OFCCP has established numerical goals for minority and female utilization in construction work. The goals are expressed in percentage terms for the contractor's aggregate workforce in each trade. OFCCP has set goals for minority utilization based on the percentage of minorities in the civilian labor force in the relevant area. There is

a single nationwide goal of 6.9 percent for utilization of women. The goals apply to all construction work in the covered geographic area, whether or not it is federal, federally assisted or non-federal. A notice advises bidders of the applicable goals for the area where the project is to be located.

13.7.4 Application. This section applies to all of a construction contractor's or subcontractor's employees who are engaged in on-site construction including those construction employees who work on a non-Federal or non-Federally assisted construction site.

13.7.4.1 Agency officials will notify the appropriate Regional Director of OFCCP that an Agency financed construction contract has been awarded, and that the equal opportunity clauses are included in the contract documents.

13.7.4.2 The Regional Director, OFCCP-DOL, will enforce the non-discrimination requirements of Executive Order 11246.

13.7.5 The prospective contractor or subcontractor must comply with the Immigration Reform and Control Act of 1986, by completing and retaining Form I-9, "Employment Eligibility Verification," for employees hired. This form is available from the Immigration and Naturalization Service, and Department of Justice.

13.7.6 The prospective contractor or subcontractor must submit Form RD 400-6, "Compliance Statement," to the applicant and an Agency official as part of the bid package, prior to any contract bid negotiations and comply with the Executive Order 11246 as stated in the contract documents.

13.8 STATUTES

13.8.1 The Contractor and each Subcontractor shall comply with the following statutes (and with regulations issued pursuant thereto, which are incorporated herein by reference):

13.8.1.1 Copeland Anti-Kickback Act (18 U.S.C. 874) as supplemented in Department of Labor regulations (29 CFR part 3). This Act provides that each Contractor shall be prohibited from inducing, by any means, any person in connection with construction to give up any part of the compensation to which the person is otherwise entitled.

13.8.1.2 Clean Air Act (42 U.S.C. 7414), section 114, and Water Pollution Control Act (33 U.S.C. 1813), section 308. Under Executive Order 11738 and Environmental Protection Agency (EPA) regulations 40 C.F.R. part 15, all Contracts in excess of \$100,000 are required to comply with these Acts. The Acts require the Contractor to:

- .1 Notify the Owner of the receipt of any communication from EPA indicating that a facility to be utilized in the performance of the Contract is under consideration to be listed on the EPA list of Violating Facilities.
- .2 Certify that any facility to be utilized in the performance of any nonexempt Contractor or Subcontractor is not listed on the EPA list of Violating Facilities as of the date of the Contract Award.
- .3 Include or cause to be included the above criteria and requirements of paragraphs .1 and .2 in every nonexempt subcontract, and that the Contractor will take such action as the Government may direct as a means of enforcing such provisions.

13.8.1.3 Restrictions on Lobbying (Public Law 101-121, section 319) as supplemented in Department of Agriculture regulations (7 CFR part 3018). This statute applies to the recipients of contracts or subcontracts that exceed \$100,000 at any tier under a Federal loan that exceeds \$150,000 or a Federal grant that exceeds \$100,000. If applicable, the Contractor must complete a certification form on lobbying activities related to the specific Federal loan or grant that is a funding source for this contract. The certification and disclosure forms shall be provided by the Owner.

13.9 RECORDS

13.9.1 If the Contract is based on a negotiated Bid, the Owner, the Agency, the Comptroller General of the United States, or any of their duly authorized representatives, shall have access to any books, documents, papers, and records of the Contractor which are pertinent to a specific Federal loan program for the purpose of making audit, examination, excerpts, and transcriptions. The Contractor shall maintain records for at least three years after the Owner makes final payment and all other pending matters are closed.

13.10 ENVIRONMENTAL REQUIREMENTS

13.10.1 Mitigation Measures - The contractor shall comply with applicable mitigation measures established in the environmental assessment for the project. These may be obtained from the Agency representative.

13.10.2 The Contractor, when constructing a Project involving trenching, excavating, or other earth moving activity, shall comply with the following environmental constraints:

13.10.2.1 Endangered Species, Historic Preservation, Human Remains and Cultural Items, Hazardous Materials, and Paleontology - Any excavation or other earth moving activity by the Contractor that provides evidence of the presence of endangered or threatened species or their critical habitat, uncovers a historical or archaeological artifact, human remains or cultural items, hazardous materials, a fossil or other paleontological materials will require the Contractor to:

- .1 Temporarily stop work;
- .2 Provide immediate notice to the Architect and the Agency, and in the case of potentially hazardous materials, provide immediate notice to local first responders and take such measures as necessary to protect the public and workers;
- .3 Take reasonable measures as necessary to protect the discovered materials or protected resource;
- .4 Abide by such direction as provided by the Agency, or Agencies responsible for resource protection or hazardous materials management; and
- .5 Resume work only upon notice from the Architect and the Agency.

13.10.3 Lead-Based Paint - The Contractor and Owner shall comply with applicable Agency requirements of the Lead-Based Paint Poisoning Prevention Act, as amended (42 U.S.C. 4821), and the Residential Lead-Based Paint Hazard Reduction Act of 1992 (42 U.S.C. 4851) for rehabilitation work on residential property built prior to 1978.

13.11 DEBARMENT AND SUSPENSION

13.11.1 The Contractor shall comply with the requirements of 7 CFR part 3017, which pertains to the debarment or suspension of a person from participating in a Federal program or activity.

ARTICLE 15 CLAIMS AND DISPUTES

Add the words "may be" after "on the parties but" in the last sentence of subparagraph 15.2.5.

Replace the word "shall" with the word "may" in the first sentence, first occurrence of subparagraph 15.3.2

Add the subparagraph: 15.4.1.2 The arbitrators will select a hearing location as close to the Owner's locale as possible.

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EQUAL OPPORTUNITY AGREEMENT

This agreement, dated 12/7/2022 between
Russell Co Industrial Dev Auth

(herein called "Recipient" whether one or more) and United States Department of Agriculture (USDA), pursuant to the rules and regulations of the Secretary of Labor (herein called the 'Secretary') issued under the authority of Executive Order 11246 as amended, witnesseth:

In consideration of financial assistance (whether by a loan, grant, loan guaranty, or other form of financial assistance) made or to be made by the USDA to Recipient, Recipient hereby agrees, if the cash cost of construction work performed by Recipient or a construction contract financed with such financial assistance exceeds \$10,000 - unless exempted by rules, regulations or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246 of September 24, 1965.

1. To incorporate or cause to be incorporated into any contract for construction work, or modification thereof, subject to the relevant rules, regulations, and orders of the Secretary or of any prior authority that remain in effect, which is paid for in whole or in part with the aid of such financial assistance, the following "Equal Opportunity Clause":

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

- (a) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited, to the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the USDA setting forth the provisions of this nondiscrimination clause.
- (b) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.
- (c) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the USDA, advising the said labor union or workers' representative of the contractor's commitments under this agreement and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- (d) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of all rules, regulations and relevant orders of the Secretary of Labor.
- (e) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, rules, regulations, and orders, or pursuant thereto, and will permit access to his books, records, and accounts by the USDA Civil Rights Office, and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- (f) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be cancelled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, or by rule, regulation or order of the Secretary of Labor, or as otherwise provided by Law.
- (g) The contractor will include the provisions of paragraph 1 and paragraph (a) through (f) in every subcontract or purchase order, unless exempted by the rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the USDA may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, that in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the USDA, the contractor may request the United States to enter into such litigation to protect the interest of the United States.

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0575-0018. The time required to complete this information collection is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

2. To be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: Provided, that if the organization so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.
3. To notify all prospective contractors to file the required 'Compliance Statement', Form RD 400-6, with their bids.
4. Form AD-425, Instructions to Contractors, will accompany the notice of award of the contract. Bid conditions for all nonexempt federal and federally assisted construction contracts require inclusion of the appropriate "Hometown" or "Imposed" plan affirmative action and equal employment opportunity requirements. All bidders must comply with the bid conditions contained in the invitation to be considered responsible bidders and hence eligible for the award.
5. To assist and cooperate actively with USDA and the Secretary in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and rules, regulations, and relevant orders of the Secretary, that will furnish USDA and the Secretary such information such as , but not limited to, Form AD-560, Certification of Nonsegregated Facilities, to submit the Monthly Employment Utilization Report, Form CC-257, as they may require for the supervision of such compliance, and that it will otherwise assist USDA in the discharge of USDA's primary responsibility for securing compliance.
6. To refrain from entering into any contract or contract modification subject to such Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and Federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by USDA or the Secretary of Labor pursuant to Part II, Subpart D, of the Executive Order.
7. That if the recipient fails or refuses to comply with these undertakings, the USDA may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the organization under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such organization; and refer the case to the Department of Justice for appropriate legal proceedings.

Signed by the Recipient on the date first written above.

Recipient

Recipient

(CORPORATE SEAL)

Russell Co Industrial Dev Auth

Name of Corporate Recipient

Attest:



Secretary

By



Chairman

UNITED STATES DEPARTMENT OF AGRICULTURE

NOTICE TO CONTRACTORS AND APPLICANTS

Attached is a nondiscrimination poster. In accordance with the terms of your construction contract with _____;

(Name of Borrower or Recipient of Grant)

the poster is to be displayed in all employment offices, on bulletin boards, and in other conspicuous places available to employees and applicants for employment. The poster must be displayed in the same manner by your subcontractors who are subject to the equal opportunity provisions of your contract, and you are required to furnish them with such posters. Additional copies of the posters may be obtained from this office.

Any reference to Federal Government contract or contractors in the standard forms or posters is to be interpreted to include any contract for construction work financed in whole or in part with a United States Department of Agriculture (USDA) loan or grant.

"Subcontractors" as used herein means any subcontractor holding a subcontract which calls for supplies or services required for the performance of the prime contract except subcontracts which either (1) do not exceed \$10,000 (\$100,000 if for standard commercial supplies or raw materials) or (2) are below the second tier and do not call for construction work at the site of construction, including any temporary location or facility established by the subcontractor specifically to meet the demands of his subcontract.

A USDA official may conduct compliance reviews of contracts covered by Executive order 11246, as amended. You will be notified if such a review is scheduled.

Date

USDA official

Name of Contractor

Address of Contractor

Application and Certificate for Payment

TO OWNER:	PROJECT:	APPLICATION NO:	<u>Distribution to:</u>
		PERIOD TO:	OWNER <input type="checkbox"/>
		CONTRACT FOR:	ARCHITECT <input type="checkbox"/>
FROM CONTRACTOR:	VIA ARCHITECT:	CONTRACT DATE:	CONTRACTOR <input type="checkbox"/>
		PROJECT NOS: / /	FIELD <input type="checkbox"/>
			OTHER <input type="checkbox"/>

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
AIA Document G703®, Continuation Sheet, is attached.

1. ORIGINAL CONTRACT SUM	\$ _____
2. NET CHANGE BY CHANGE ORDERS	\$ _____
3. CONTRACT SUM TO DATE (Line 1 ± 2)	\$ _____
4. TOTAL COMPLETED & STORED TO DATE (Column G on G703)	\$ _____
5. RETAINAGE:	
a. _____% of Completed Work (Column D + E on G703)	\$ _____
b. _____% of Stored Material (Column F on G703)	\$ _____
Total Retainage (Lines 5a + 5b, or Total in Column I of G703)..... \$ _____	
6. TOTAL EARNED LESS RETAINAGE	\$ _____ (Line 4 minus Line 5 Total)
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT	\$ _____ (Line 6 from prior Certificate)
8. CURRENT PAYMENT DUE	\$
9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 minus Line 6)	\$ _____

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	\$ _____	\$ _____
Total approved this month	\$ _____	\$ _____
TOTAL	\$ _____	\$ _____
NET CHANGES by Change Order	\$ _____	

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____

State of: _____

County of: _____

Subscribed and sworn to before
me this _____ day of _____

Notary Public:

My commission expires: _____

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED \$ _____

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

USDA Rural Development
Attachment to AIA Document G702
(Application and Certificate for Payment)

In lieu of RD Form 1924-18 when used in
conjunction with AIA Document G702

Project: _____

Payment application number: _____ Amount Certified _____

The Referenced Payment Application is not valid until signed by the
Owner, Architect, Contractor and Agency.

CONTRACTOR'S CERTIFICATION:

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

Contractor: _____

By: _____

Date: _____

APPROVED BY OWNER:

Owner: _____

By: _____

Date: _____

ARCHITECT OR ENGINEER'S CERTIFICATION:

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

Architect or Engineer: _____

By: _____

Date: _____

ACCEPTED BY AGENCY:

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

By: _____

Title: _____

Date: _____



Continuation Sheet

AIA Document G702®, Application and Certificate for Payment, or G732™, Application and Certificate for Payment, Construction Manager as Adviser Edition, containing Contractor's signed certification is attached. Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO:

APPLICATION DATE:

PERIOD TO:

ARCHITECT'S PROJECT NO:

[illegible]



AIA[®] Document G701[™] – 2017

Change Order

PROJECT: *(name and address)*

CONTRACT INFORMATION:

Contract For:

Date:

CHANGE ORDER INFORMATION:

Change Order Number:

Date:

OWNER: *(name and address)*

ARCHITECT: *(name and address)*

CONTRACTOR: *(name and address)*

THE CONTRACT IS CHANGED AS FOLLOWS:

(Insert a detailed description of the change and, if applicable, attach or reference specific exhibits. Also include agreed upon adjustments attributable to executed Construction Change Directives.)

The original (Contract Sum) (Guaranteed Maximum Price) was

\$ _____

The net change by previously authorized Change Orders

\$ _____

The (Contract Sum) (Guaranteed Maximum Price) prior to this Change Order was

\$ _____

The (Contract Sum) (Guaranteed Maximum Price) will be (increased) (decreased) (unchanged) by this Change Order in the amount of

\$ _____

The new (Contract Sum) (Guaranteed Maximum Price), including this Change Order, will be

\$ _____

The Contract Time will be (increased) (decreased) (unchanged) by

() days.

The new date of Substantial Completion will be

NOTE: This Change Order does not include adjustments to the Contract Sum or Guaranteed Maximum Price, or the Contract Time, that have been authorized by Construction Change Directive until the cost and time have been agreed upon by both the Owner and Contractor, in which case a Change Order is executed to supersede the Construction Change Directive.

NOT VALID UNTIL SIGNED BY THE ARCHITECT, CONTRACTOR AND OWNER.

ARCHITECT *(Firm name)*

CONTRACTOR *(Firm name)*

OWNER *(Firm name)*

SIGNATURE

SIGNATURE

SIGNATURE

PRINTED NAME AND TITLE

PRINTED NAME AND TITLE

PRINTED NAME AND TITLE

DATE

DATE

DATE

USDA Rural Development
Attachment to AIA G701
(Contract Change Order)

Project: _____

Change Order Number: _____ Change Order Amount: _____

The Referenced Change Order is not valid until signed by the Owner, Architect, Contractor and Agency.

Requested by: _____ Date: _____
(Owner)

Recommended by: _____ Date: _____
(Owner's Architect / Engineer)

Accepted by: _____ Date: _____
(Contractor)

Agency Concurrence: _____ Date: _____

Date _____

Dear Sir:

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

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

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

WARNING

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

Sincerely,

Contractor

Position 6

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

RELEASE BY CLAIMANTS

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

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

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

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

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

BUILDER'S WARRANTY

Names and Address of Purchasers or Owners

Property

For good and valuable consideration, the undersigned Warrantor hereby warrants to the Purchasers or Owners identified above and to the successors or transferees, all of whom are hereinafter referred to as Owners that:

The building, including appurtenances located on the property identified above, is constructed or improved in substantial conformity with the drawings and specifications which have been accepted in writing by the respective USDA Agency. This warranty applies to all workmanship, materials, and the installation of equipment (including, but not limited to, the heating system, water heater, ranges and refrigerator).

The Owners shall give written notice to the Warrantor promptly after the discovery of any defective condition. Such written notice must be given to the Warrantor during the period of warranty. The period of warranty shall be (a) in the case of new construction or rehabilitation, one year from the date of initial occupancy of the completed or rehabilitated building, or (b) in the case of improvements made to an existing building owned by the Owners prior to the improvements being made, one year from the date of the completion of the work.

It is agreed and understood that this warranty shall apply only to those defective conditions of which the Warrantor has been given written notice during the period of warranty.

Warrantor further agrees that warrantor will take any necessary actions to correct such defective conditions within _____ days of receipt of written notice. If such action is not taken within _____ days, the Owners may, at their option, contract with another party for the correction of the defects. Warrantor agrees to pay any expenses incurred by the Owners to correct defects covered by this warranty.

This warranty shall be in addition to, and in no way reduce, all other rights and privileges which such Owners may have under any other law or instrument, and shall be binding on the Warrantor notwithstanding any provision to the contrary contained in the contract of purchase or any other instrument executed by the Owners.

This warranty is executed, in part, for the purpose of inducing the United States Department of Agriculture, (USDA) to make, insure, or guarantee a loan on the Property.

If this warranty is signed by anyone other than the Warrantor, the person signing for the Warrantor represents and certifies that the person is authorized to execute same by the Warrantor and by the person's signature the Warrantor is bound under the terms and conditions of this warranty

- NOTES: A. The warrantor must complete all three copies except dates, meet with owner to agree on notification period, sign and give to the Owner with the final request for payment.
Owner must meet with Warrantor to agree on warranty notification period and to date and sign the warranty, owner must retain original, and forward one copy to contractor, and one to the respective USDA Agency with the final request for payment.
- B. This warranty shall be required in all cases involving new construction or rehabilitation of buildings including those built under contract, those built for sale without the respective USDA Agency's required construction inspections and those under conditional commitment procedures.

WARNING

Section 1001 of Title 18, United States Code provides: "Whoever, in any matter within the jurisdiction of any department or agency of the United States knowingly and willfully . . . makes any false, fictitious or fraudulent statements or representation, or makes or uses any false writing or document knowing the same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than \$250,000 or imprisoned not more than five years, or both."

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0575-0042. The time required to complete this information collection is estimated to average 15 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

In addition to the preceding warranty, the following items are covered by a company warranty or guarantee as follows:

Item	Serial & Model No.	Name and Address of Company	No. Yrs. or Mos. of Warranty
Heating System			
Kitchen Range			
Water Heater			
Refrigerator			
Manufactured Home			
Other			
Other			

NOTICE TO OWNERS: ANY NOTICE OF DEFECTIVE WORKMANSHIP, MATERIALS OR NONCONFORMITY MUST BE DELIVERED TO THE WARRANTOR NO LATER THAN

_____ .

(Warrantor shall insert date one (1) year from initial occupancy, date of conveyance of title or date of completion, whichever is applicable.) All plastic pipe used in this job will carry a 5-year warranty from the date shown by the Warrantor above.

We have furnished the above company warranties or guarantees to the Owners for their use. If this warranty covers a manufactured home, we certify that the manufactured home property substantially complies with the plans and specifications and the manufactured home sustained no hidden damage during transportation and, if manufactured in separate sections, that the sections were properly joined and sealed according to the manufacturer's specifications.

The Warrantor has signed this warranty this _____ day of _____ , _____ .

_____(Warrantor's Address) _____(SEAL)
Warrantor (Signature & Title)

Receipt of this warranty is acknowledged this _____ day of _____ , _____ .

Owner(s)



AIA[®] Document G704[™] – 2017

Certificate of Substantial Completion

PROJECT: *(name and address)*

CONTRACT INFORMATION:

Contract For:

Date:

CERTIFICATE INFORMATION:

Certificate Number:

Date:

OWNER: *(name and address)*

ARCHITECT: *(name and address)*

CONTRACTOR: *(name and address)*

The Work identified below has been reviewed and found, to the Architect's best knowledge, information, and belief, to be substantially complete. Substantial Completion is the stage in the progress of the Work when the Work or designated portion is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The date of Substantial Completion of the Project or portion designated below is the date established by this Certificate.

(Identify the Work, or portion thereof, that is substantially complete.)

ARCHITECT *(Firm Name)*

SIGNATURE

PRINTED NAME AND TITLE

DATE OF SUBSTANTIAL COMPLETION

WARRANTIES

The date of Substantial Completion of the Project or portion designated above is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below:

(Identify warranties that do not commence on the date of Substantial Completion, if any, and indicate their date of commencement.)

WORK TO BE COMPLETED OR CORRECTED

A list of items to be completed or corrected is attached hereto, or transmitted as agreed upon by the parties, and identified as follows:

(Identify the list of Work to be completed or corrected.)

The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Unless otherwise agreed to in writing, the date of commencement of warranties for items on the attached list will be the date of issuance of the final Certificate of Payment or the date of final payment, whichever occurs first. The Contractor will complete or correct the Work on the list of items attached hereto within () days from the above date of Substantial Completion.

Cost estimate of Work to be completed or corrected: \$

The responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work, insurance, and other items identified below shall be as follows:

(Note: Owner's and Contractor's legal and insurance counsel should review insurance requirements and coverage.)

The Owner and Contractor hereby accept the responsibilities assigned to them in this Certificate of Substantial Completion:

CONTRACTOR *(Firm Name)*

SIGNATURE

PRINTED NAME AND TITLE

DATE

OWNER *(Firm Name)*

SIGNATURE

PRINTED NAME AND TITLE

DATE



AIA[®] Document G706[™] – 1994

Contractor's Affidavit of Payment of Debts and Claims

PROJECT: *(Name and address)*

ARCHITECT'S PROJECT NUMBER:

OWNER ☐

CONTRACT FOR:

ARCHITECT ☐

CONTRACTOR ☐

TO OWNER: *(Name and address)*

CONTRACT DATED:

SURETY ☐

OTHER ☐

STATE OF:

COUNTY OF:

The undersigned hereby certifies that, except as listed below, payment has been made in full and all obligations have otherwise been satisfied for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or Owner's property might in any way be held responsible or encumbered.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

CONTRACTOR: *(Name and address)*

1. Consent of Surety to Final Payment. Whenever Surety is involved, Consent of Surety is required. AIA Document G707[™], Consent of Surety to Final Payment, may be used for this purpose.

Indicate attachment: ☐ Yes ☐ No

BY:

The following supporting documents should be attached hereto if required by the Owner:

(Signature of authorized representative)

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof
3. Contractor's Affidavit of Release of Liens (AIA Document G706A[™])

(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:

My Commission Expires:

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.

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Purchasers are permitted to reproduce ten (10) copies of this document when completed. To report copyright violations of AIA Contract Documents, e-mail The American Institute of Architects' legal counsel, copyright@aia.org.



AIA[®] Document G706A[™] – 1994

Contractor's Affidavit of Release of Liens

PROJECT: <i>(Name and address)</i>	ARCHITECT'S PROJECT NUMBER:	OWNER <input type="checkbox"/>
	CONTRACT FOR:	ARCHITECT <input type="checkbox"/>
		CONTRACTOR <input type="checkbox"/>
TO OWNER: <i>(Name and address)</i>	CONTRACT DATED:	SURETY <input type="checkbox"/>
		OTHER <input type="checkbox"/>

STATE OF:

COUNTY OF:

The undersigned hereby certifies that to the best of the undersigned's knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens or encumbrances or the right to assert liens or encumbrances against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

CONTRACTOR: *(Name and address)*

BY:

(Signature of authorized representative)

(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:

My Commission Expires:

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.



AIA[®] Document G707[™] – 1994

Consent of Surety to Final Payment

PROJECT: *(Name and address)*

ARCHITECT'S PROJECT NUMBER:

OWNER ☐

CONTRACT FOR:

ARCHITECT ☐

CONTRACTOR ☐

TO OWNER: *(Name and address)*

CONTRACT DATED:

SURETY ☐

OTHER ☐

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(Insert name and address of Surety)

on bond of
(Insert name and address of Contractor)

, SURETY,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve
the Surety of any of its obligations to
(Insert name and address of Owner)

, CONTRACTOR,

as set forth in said Surety's bond.

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:
(Insert in writing the month followed by the numeric date and year.)

, OWNER,

(Surety)

(Signature of authorized representative)

Attest:
(Seal)

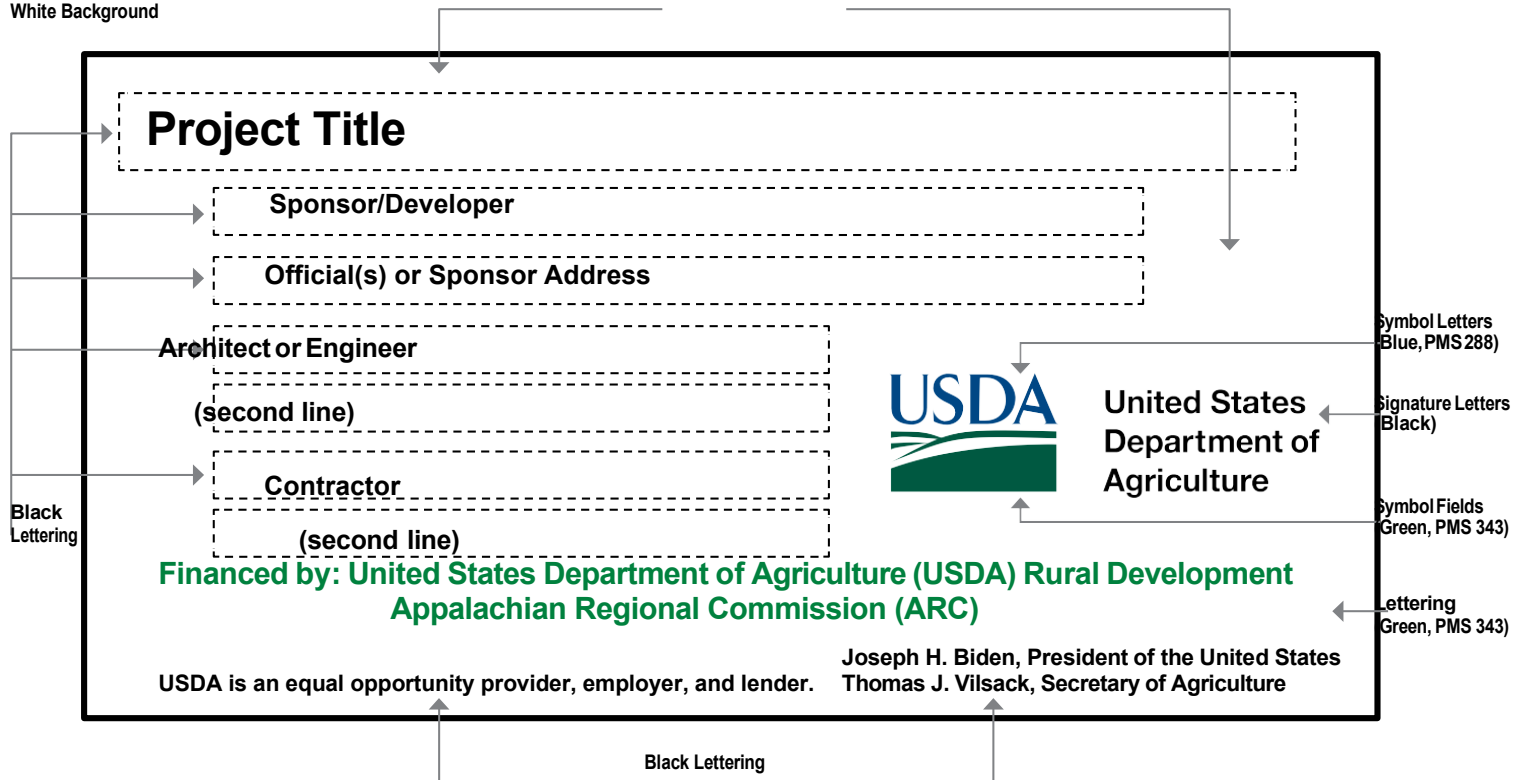
(Printed name and title)

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.

TEMPORARY CONSTRUCTION SIGN FOR RURAL DEVELOPMENT & ARC PROJECTS

Recommended Fonts: Helvetica, Arial, or Myriad Pro

White Background



SIGN DIMENSIONS: 1200mm x 2400mm x 19mm (approx. 4'x8'x³/₄")
PLYWOOD PANEL (APA RATED A-B GRADE-EXTERIOR)

LABOR STANDARDS PROVISIONS

The following clauses shall be made part of the contract documents for projects subject to the Davis-Bacon and Related Acts:

(Section a) Davis-Bacon Act (40 U.S.C. 276a - 276a-7).

(1) Minimum Wages.

(i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project) will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b) (2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (1)(iv) of this section, also, regular contributions made or costs incurred for more than a weekly period (but less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during each weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in paragraph (4) of this section. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records actually set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii) This paragraph has been suspended indefinitely (58 FR 58955, Nov. 5, 1993).

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

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided, that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program

(v) Additional Classifications.

(A) The Contracting Officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The Contracting Officer shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

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

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

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

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the Contracting Officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the Contracting Officer to the Administrator of the Wage and Hour Division, Employment

Standards Administration, U.S. Department of Labor, Washington, D.C., 20210. The Administrator, or an authorized representative will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the Contracting Officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the Contracting Officer shall refer the questions, including the views of all interested parties and the recommendation of the Contracting Officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the Contracting Officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1) (v) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(2) Withholding. The Agency or Contracting Officer shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally- assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor, the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, the Agency may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under paragraph (1)(iv) of this section that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii) Payrolls.

(A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Agency if the Agency is a party to the contract, but if the Agency is not such a party, the contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the Agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under paragraph (3)(i) of this section. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

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

(1) That the payroll for the payroll period contains the information required to be maintained under paragraph (3)(i) of this section and that such information is correct and complete;

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

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

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

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

(iii) The contractor or subcontractor shall make the records required under paragraph (3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the Agency or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Agency may, after written notice to the contractor, sponsor, applicant, or owner, take

such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification,

fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

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

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

(6) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses contained in paragraphs (1) through (10) of this section and such other clauses as the Agency may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this section.

(7) Contract termination: debarment. A breach of the contract clauses in this section may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

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

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

(10) Certification of Eligibility.

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

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a) (1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code 18 U.S.C. 1001.

(Section b) Contract Work Hours and Safety Standards Act (40 U.S.C. 327-333).

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

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

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

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

oOo

"General Decision Number: KY20230042 05/05/2023

Superseded General Decision Number: KY20220042

State: Kentucky

Construction Type: Building

Counties: Barren, Casey, Clinton, Cumberland, Green, Hart, Knox, Logan, Marion, McCreary, Metcalfe, Monroe, Russell, Taylor and Wayne Counties in Kentucky.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	<ul style="list-style-type: none">. Executive Order 14026 generally applies to the contract.. The contractor must pay all covered workers at least \$16.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2023.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	<ul style="list-style-type: none">. Executive Order 13658 generally applies to the contract.. The contractor must pay all covered workers at least \$12.15 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2023.

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

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

Modification Number	Publication Date
0	01/06/2023
1	01/13/2023
2	02/24/2023
3	04/14/2023
4	05/05/2023

ASBE0046-002 05/01/2022

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR.....	\$ 26.59	16.69

BOIL0040-001 01/01/2021

	Rates	Fringes
BOILERMAKER.....	\$ 37.60	27.49

CARP1650-010 06/01/2022

	Rates	Fringes
CARPENTER (Excludes Acoustical Ceiling Installation, Drywall Hanging, and Metal Stud Installation).....	\$ 28.23	20.89

ELEC0317-005 05/30/2022

	Rates	Fringes
ELECTRICIAN.....	\$ 35.85	28.25

ELEV0011-001 01/01/2023

	Rates	Fringes
ELEVATOR MECHANIC.....	\$ 52.72	37.335+a+b

PAID HOLIDAYS:

a. New Year's Day, Memorial Day, Independence Day, Labor Day, Vetern's Day, Thanksgiving Day, the Friday after Thanksgiving, and Christmas Day.

b. Employer contributes 8% of regular hourly rate to vacation pay credit for employee who has worked in business more than 5 years; 6% for less than 5 years' service.

ENG10181-083 06/01/2021

	Rates	Fringes
POWER EQUIPMENT OPERATOR (Bobcat/Skid Steer/Skid Loader).....	\$ 33.51	17.85

ENG10181-084 06/01/2021

	Rates	Fringes
POWER EQUIPMENT OPERATOR (Oiler).....	\$ 29.70	17.85

ENG10181-085 06/01/2021

	Rates	Fringes
POWER EQUIPMENT OPERATOR (Crane).....	\$ 34.60	17.85

CRANES WITH BOOM 150 FEET & OVER, INCLUDING JIB, SHALL RECEIVE \$.75 ABOVE THE WAGE RATE.
ALL CRANES WITH PILING LEADS WILL RECEIVE \$.50 ABOVE THE WAGE, REGARDLESS OF BOOM LENGTH.

ENG10181-086 06/01/2021

	Rates	Fringes
POWER EQUIPMENT OPERATOR		

(Forklift).....	\$ 33.51	17.85
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ENGI0181-092 06/01/2021

	Rates	Fringes
POWER EQUIPMENT OPERATOR (Bulldozer).....	\$ 33.51	17.85

IRON0769-005 06/01/2021

	Rates	Fringes
IRONWORKER, REINFORCING		
ZONE 1.....	\$ 33.00	27.29
ZONE 2.....	\$ 33.40	27.29
ZONE 3.....	\$ 35.00	27.29

ZONE 1 - (no base rate increase) Up to 10 mile radius of
Union Hall, 1643 Greenup Ave, Ashland, KY.

ZONE 2 - (add \$0.40 per hour to base rate) 10 to 50 mile
radius of Union Hall, 1643 Greenup Ave, Ashland, KY.

ZONE 3 - (add \$2.00 per hour to base rate) 50 mile radius &
over of Union Hall, 1643 Greenup Ave, Ashland, KY.

LABO0189-007 06/01/2022

	Rates	Fringes
LABORER (Pipelayer).....	\$ 25.75	15.28

LABO0576-011 07/01/2022

	Rates	Fringes
LABORER (Carpenter Tender).....	\$ 21.52	11.90

LABO0576-012 07/01/2022

	Rates	Fringes
LABORER (Mason Tender - Cement/Concrete).....	\$ 21.72	11.90

LABO1392-004 07/01/2022

	Rates	Fringes
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LABORER (Mason Tender - Brick)...	\$ 23.95	15.22
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PAIN1072-005 12/01/2022

	Rates	Fringes
PAINTER (Spray Only).....	\$ 29.49	23.35

PLUM0452-014 11/01/2022

	Rates	Fringes
PIPEFITTER.....	\$ 36.00	20.61

SFKY0669-001 01/01/2023

	Rates	Fringes
SPRINKLER FITTER (Fire Sprinklers).....	\$ 39.52	23.17

SHEE0110-006 06/01/2021

	Rates	Fringes
SHEET METAL WORKER (Excludes HVAC Duct Installation).....	\$ 33.74	23.31

* UAVG-KY-0007 01/01/2023

	Rates	Fringes
IRONWORKER, ORNAMENTAL.....	\$ 32.49	25.93

* UAVG-KY-0008 01/01/2023

	Rates	Fringes
LABORER: Power Tool Operator....	\$ 26.87	17.81

SUKY2015-023 06/02/2015

	Rates	Fringes
BRICKLAYER.....	\$ 24.61	11.88
CEMENT MASON/CONCRETE FINISHER...	\$ 27.99	0.00
IRONWORKER, STRUCTURAL.....	\$ 22.31	15.40

LABORER: Common or General.....\$ 16.97	6.11
OPERATOR:	
Backhoe/Excavator/Trackhoe.....\$ 21.11	13.00
OPERATOR: Grader/Blade.....\$ 24.33	13.00
PAINTER (Brush and Roller).....\$ 18.20	6.43
PLUMBER.....\$ 33.41	16.67
ROOFER.....\$ 22.31	7.41
SHEET METAL WORKER (HVAC Duct Installation Only).....\$ 25.91	8.06
TILE FINISHER.....\$ 17.67	7.45
TILE SETTER.....\$ 25.77	6.10
TRUCK DRIVER: Dump Truck.....\$ 17.07	6.25

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

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

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after

award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

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

Union Rate Identifiers

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

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

Survey Rate Identifiers

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

wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

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

Union Average Rate Identifiers

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

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations

Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISIO"



Kentucky Transportation Cabinet
Department of Highways
Division of Maintenance
Permits Branch

TC 99-1 (B)
07/2018
Page 1 of 1

ENCROACHMENT PERMIT

KYTC KEPT #: 08-2022-00170

Permittee: Russell County Industrial Development Authority

Permit Type / Subtype: Entrance / Commercial

Work Completion Date: 7/13/2023

INDEMNITIES		
Type	Amount Required	Tracking Number
Performance Bond	\$0.00	
Cash / Check	\$0.00	
Self-Insured	\$0.00	
Payment Bond	\$0.00	
Liability Insurance	\$0.00	

This permit has been: **APPROVED** ☒

DENIED ☐

JamesE Jones, P.E.

D8 - Chief District Engineer

9/1/2022

SIGNATURE

TITLE

DATE

The TC 99-1(B), including the application TC-99 1(A) and all related and accompanying documents and drawings make up the permit. It is not a permit unless both the TC 99-1(A) and TC 99-1(B) are both present.

LOCATION(S)			
Description	County - Route	Latitude	Longitude
	Russell - KY 3280	37.031707	-85.084876

NOTICE OF COMPLETION OF ENCROACHMENT PERMIT WORK

PERMITTEE

Name: Russell County Industrial Development Authority
Contact Person: Lucas Witt
Address: PO Box 1068
City: Jamestown
State: Kentucky
Zip: 42629
Telephone: (270) 866-7070

PROJECT IDENTIFICATION

Permit Number: 08-2022-00170

I wish to notify the Department of Highways that the above mentioned permit work and any necessary right-of-way restoration have been completed and are ready for final inspection.

Permittee

Please return this form to the address below when work is completed and ready for final inspection.

Please Return to: Permit Engineer
Department of Highways, District 8 Office
1660 South US 27
Somerset, Kentucky 42502
(606) 677-4017
www.transportation.ky.gov/

LOCATION(S)			
Description	County - Route	Latitude	Longitude
	Russell - KY 3280	37.031707	-85.084876



KENTUCKY TRANSPORTATION CABINET
Department of Highways
PERMITS BRANCH

TC 99-1A
Rev. 10/2020
Page 1 of 4

APPLICATION FOR ENCROACHMENT PERMIT

KYTC KEPT #: 08-2022-00170

SECTION 1: APPLICANT CONTACT INFORMATION

APPLICANT Russell County Industrial Dev. Auth.	ADDRESS P.O. Box 1068		
EMAIL rcida@#duotel.com	CITY Jamestown	STATE KY	ZIP 42629
CONTACT NAME 1 Lucas Witt, ED Director	EMAIL lucas@mwm-llc.com	PHONE # 270-866-7070	
		CELL # 859-948-5646	
CONTACT NAME 2 (if applicable) Glen Ross, Engineer	EMAIL glenross@mselex.com	PHONE # 859-223-5694	
		CELL # 859-619-0501	

SECTION 2: PROPOSED WORK LOCATION

ADDRESS 531 French Valley Road	CITY Russell Springs	STATE Kentucky	ZIP 42642	
COUNTY Russell	ROUTE # KY 3280	MILE POINT 4.76	LONGITUDE (X) 37° 01' 54"	LATITUDE (Y) 85° 05' 05"

ADDITIONAL LOCATION INFORMATION:

FOR KYTC USE ONLY

PERMIT TYPE: ☐ Air Right ☒ Entrance ☐ Utilities ☐ Vegetation Removal ☐ Other: _____

ACCESS: ☐ Full ☐ Partial ☒ by Permit **LOCATION:** ☐ Left ☒ Right ☐ Crossing

SECTION 3: GENERAL DESCRIPTION OF WORK

Provide an entrance for Lot 2 at the Lake Cumberland Regional Industrial Complex for an entrance to the proposed Seed Academy.

THE UNDERSIGNED APPLICANT(s), being duly authorized representative(s) or owner(s), DO AGREE TO ALL ORIGINAL UNEDITED TERMS AND CONDITIONS ON THE TC 99-1A, pages 1-4.

SIGNATURE

7-5-22

DATE

This is not a permit unless and until the applicant(s) receives an approved TC 99-18 from KYTC. This application shall become void if not approved by the cancellation date. The cancellation date shall be a minimum of one year from the date the applicant submits their application.



APPLICATION FOR ENCROACHMENT PERMIT

TERMS AND CONDITIONS

1. The permit, including this application and all related and accompanying documents and drawings making up the permit, remains in effect and is binding upon the Applicant/Permittee, its successors and assigns, as long as the encroachment(s) exists and also until the permittee is finally relieved by the Department of Highways from all its obligations.
2. Applicant shall meet all requirements of the Clean Water Act if the project will disturb one acre or more, the applicant shall obtain a KPDES KYR10 Permit from the Kentucky Division of Water. All disturbed areas shall meet the requirements of the Department of Highway's Standard Specifications, Sections 212 and 213, as amended.
3. **INDEMNITY:**
 - A. **PERFORMANCE BOND:** The permittee shall provide to the Department a performance bond according to the Permits Manual, Section PE-203 as a guarantee of conformance with the Department's Encroachment Permit requirements.
 - B. **PAYMENT BOND:** At the discretion of the department, a payment bond shall be required of the permittee to ensure payment of liquidated damages assessed to the permittee.
 - C. **LIABILITY INSURANCE:** Liability insurance shall be required of the permittee (in an amount approved by the department) to cover all liabilities associated with the encroachment.
 - D. It shall be the responsibility of the permittee, its successors and assigns, to maintain all indemnities in full force and effect until the permittee is authorized to release the indemnity by the Department.
4. A copy of this application and all related documents making up the approved permit shall be given to the applicant and shall be made readily available for review at the work site at all times.
5. Perpetual maintenance of the encroachment is the responsibility of the permittee, its successors and assigns, with the approval of the Department as required, unless otherwise stated.
6. Permittee, its successors and assigns, shall comply with and agree to be bound by the requirements and terms of (a) this application and all related documents making up the approved permit, (b) by the Department's Permits Manual, and (c) by the Manual on Uniform Traffic Control Devices, both manuals as revised to and in effect on the date of issuance of the permit, all of which documents are made a part thereof by this reference. Compliance by the permittee, its successors and assigns, with subsequent revisions to applicable provisions of either manual or other policy of the Department may be made a condition of allowing the encroachment to persist under the permit.
7. Permittee agrees that this and any encroachment may be ordered removed by the Department at any time, and for any reason, upon thirty days written notice to the last known address of the applicant or to the address at the location of the encroachment. The permittee agrees that the cost of removing and of restoring the associated right-of-way is the responsibility of the permittee, its successors and assigns.
8. Permittee, its successors and assigns, agree that if the Department determines that motor vehicular safety deficiencies develop as a result of the installation or use of the encroachment, the permittee, its successors and assigns, shall provide and bear the expenses to adjust, relocate, or reconstruct the facilities, add signs, auxiliary lanes, or other corrective measures reasonably deemed necessary by the Department within a reasonable time after receipt of a written notice of such deficiency. The period within which such adjustments, relocations, additions, modifications, or other corrective measures must be completed will be specified in the notice.
9. Where traffic signals are required as a condition of granting the requested permit or are thereafter required to correct motor vehicular safety deficiencies, as determined by the Department, the costs for signal equipment and installation(s) shall be borne by the permittee, its successors and assigns and the Department in its reasonable discretion and only in accordance with the Department's current policy set forth in the Traffic Operations Manual and Permits Manual. Any modifications to the permittee's entrance necessary to accommodate signalization (including necessary easement(s) on private property) shall be the responsibility of the permittee, its successors and assigns, at no expense to the Department.



KENTUCKY TRANSPORTATION CABINET
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APPLICATION FOR ENCROACHMENT PERMIT

10. The requested encroachment shall not infringe on the frontage rights of an abutting owner without their written consent as hereinafter described. Each abutting owner shall express their consent, which shall be binding on their successors and assigns, by the submission of a notarized statement as follows, "I (we), _____, hereby consent to the granting of the permit requested by the applicant along Route _____, which permit does affect frontage rights along my (our) adjacent real property." By signature(s) _____, subscribed and sworn by _____, on this date _____.
11. The permit, if approved, is subject to the agreement that it shall not interfere with any similar rights or permit(s) previously granted to any other party, except as otherwise provided by law.
12. Permittee shall include documentation which describes the facilities to be constructed. Permittee, its successors and assigns, agree as a condition of the granting of the permit to construct and maintain any and all permitted facilities or other encroachments in strict accordance with the submitted and approved permit documentation and the policies and procedures of the Department. Permittee, its successors and assigns, shall not use facilities authorized herein in any manner contrary to that prescribed by the approved permit. Only normal usage as contemplated by the parties and by this application and routine maintenance are authorized by the permit.
13. Permittee, its successors and assigns, at all times from the date permitted work is commenced until such time as all permitted facilities or other encroachments are removed from the right-of-way and the right-of-way restored, **shall defend, protect, indemnify and save harmless** the Department from any and all liability claims and demands arising out of the work, encroachment, maintenance, or other undertaking by the permittee, its successors and assigns, related or undertaken pursuant to the granted permit, due to any claimed act or omission by the permittee, its servants, agents, employees, or contractors. This provision shall not inure to the benefit of any third party nor operate to enlarge any liability of the Department beyond that existing at common law or otherwise if this right to indemnity did not exist.
14. Upon a violation of any provision of the permit, or otherwise in its reasonable discretion, the Department may require additional action by the permittee, its successors and assigns, up to and including the removal of the encroachment and restoration of the right-of-way. In the event additional actions required by the Department under the permit are not undertaken as ordered and within a reasonable time, the Department may in its discretion cause those or other additional corrective actions to be undertaken and the Department shall recover the reasonable costs of those corrective actions from the permittee, its successors and assigns.
15. Permittee, its successors and assigns, shall use the encroachment premises in compliance with all requirements of federal law and regulation, including those imposed pursuant to Title VI of the Civil Right Act of 1964 (42 U.S.C. § 2000d et seq.) and the related regulations of the U.S. Department of Transportation in Title 49 C.F.R. Part 21, all as amended.
16. Permittee, its successors and assigns, agree that if the Department determines it is necessary for the facilities or other encroachment authorized by the permit to be removed, relocated or reconstructed in connection with the reconstruction, relocation or improvement of a highway, the Department may revoke permission for the encroachment to remain under the permit and may order its removal, relocation or reconstruction by the permittee, its successors and assigns, at the expense of the permittee, except where the Department is required by law to pay any or all of those costs.



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APPLICATION FOR ENCROACHMENT PERMIT

17. Permittee agrees that the authorized permit is personal to the permittee and shall remain in effect until such time as (a) the permittee's rights to the adjoining real property to have benefitted from the requested encroachment have been relinquished, (b) until all permit obligations have been assumed by appropriate successors and assigns, and (c) unless and until a written release from permit obligations has been granted by the Department. The permit and its requirements shall also bind the real property to have benefitted from the requested encroachment to the extent permitted by law. The permit and the related encroachment become the responsibility of the successors and assigns of the permittee and the successors and assigns of each property owner benefitting from the encroachment, or the encroachment may not otherwise permissibly continue to be maintained on the right-of-way. (Does not apply to utility encroachments serving the general public.)
18. If work authorized by the permit is within a highway construction project in the construction phase, it shall be the responsibility of the permittee to make personal contact with the Department's Engineer on the project in order to coordinate all permitted work with the Department's prime contractor on the project.
19. This permit is not intended to, nor shall it, affect, alter or alleviate any requirement imposed upon the permittee, its successors and assigns, by any other agency.
20. Permittee, its successors and assigns, agree to contain and maintain all dirt, mud, and other debris emanating from the encroachment away from the surrounding right-of-way and the travel way of the highway hereafter and at all times that its obligations under the permit remain in effect.
21. Before You Dig: The contractor is instructed to call 1-800-752-6007 to reach KY 811, the One-Call system for information on the location of existing underground utilities. The call is to be placed a minimum of two (2) and no more than ten (10) business days prior to excavation. The contractor should be aware that the owners of underground facilities are not required to be members of the KY 811 One-Call Before U-Dig (BUD) service. The contractor must coordinate excavation with the utility owners, including those whom do not subscribe to KY 811. It may be necessary for the contractor to contact the County Clerk to determine what utility companies have facilities in the area.
22. The undersigned Utility acknowledges ownership and control of the facilities proposed to be installed, modified, or extended by the Applicant/Permittee and agrees to be bound by the requirements and terms of this application and all related documents making up the approved permit, by the Department's Permits Guidance Manual, and by all applicable regulations and statutes in effect on the date of issuance of the permit. This information and application is certified correct to the best knowledge and belief of the undersigned Utility.

UTILITY

NAME (Utility Representative)

TITLE (Utility Representative)

SIGNATURE (Utility Representative)

DATE



To Submit a Locate Request
24 Hours a Day, Seven Days a Week:
Call 811 or 800-752-6007

KY Transportation Cabinet – District 8
Permit Number 08-2022-00170

Applicant to construct a new 36 foot commercial entrance right of mile point 4.76 on KY 3280 in Russell County with 25 feet radii as per entrance diagram and encroachment terms. No pipe is required. Entrance to be paved with 10 inches thickness of DGA, 3.0 inches thickness asphalt base, and 1.0 inch thickness asphalt. Side slopes of the entrance shall be 6:1 or flatter as per KY Standard Drawing RPM-110-07.

Construction of the entrance shall not interfere with any construction or maintenance operations by the Transportation Cabinet on KY 3280.

No changes shall be made contrary to this permit and the applicant's plans without first notifying and being approved by the Permit Engineer.

All work and materials shall meet or exceed the Standard Specifications.

All disturbed portions of the right-of-way are to be restored to grass as per Kentucky Department of Highways Standard Specifications for Road and Bridge Construction, 2019 edition. A satisfactory turf, as determined by the Department, is to be established by the permittee prior to release of indemnity.

The minimum rate of application for seeding and protection method II per 1,000 square feet shall be applied as follows:

2.5 lbs of seed mixture
12 lbs of 20-10-10 fertilizer
150 lbs of agricultural limestone

Roadway drainage shall be maintained at all times, with silt checks placed in the roadway ditch where needed and near the inlet of all culvert and entrance pipe to control erosion and prevent silt from settling inside of pipe.

The applicant shall provide all necessary steps to contain all silting within the work area as specified in Section 212 and Section 213, Department's Standard Specifications for Road and Bridge Construction.

Work area within the Kentucky Department of Highways right of way shall be signed and flagged in accordance to the Manual on Uniform Traffic Control Devices before any work is to begin on the Kentucky Department of Highways right of way.

This permit will be terminated and work will stop immediately at any time the Department of Highways discovers or is notified of any unsafe or hazardous conditions until corrections have been made.

It shall be the responsibility of the applicant to contact the Kentucky Department of Highways District 8 Permits Office at 606-677-4017 a minimum of 2 working days before work begins on KY Transportation Cabinet right of way.



ENCROACHMENT PERMIT GENERAL NOTES & SPECIFICATIONS

Permit No. 08-2022-00170

I. SAFETY

A. General Provisions

- ☒ All signs and control of traffic shall be in accordance with the Manual on Uniform Traffic Control Devices for Streets and Highways, latest edition, Part VI, Kentucky Department of Highways Standard Drawings, and safety requirements shall comply with the Permits Manual.
- ☒ All work necessary in shoulder or ditch line areas of a state highway shall be scheduled to be promptly completed so that hazards adjacent to the traveled way are kept to an absolute minimum.
- ☒ No more than one (1) traveled-lane shall be blocked or obstructed during normal working hours. All signs and flaggers during lane closure shall conform to the Manual on Uniform Traffic Control Devices and Kentucky Department of Highways Standard Drawings.
- ☒ When necessary to block one (1) traveled-lane of a state highway, the normal working hours shall be as directed by the Department. No lanes shall be blocked or obstructed during adverse weather conditions (rain, snow, fog, etc.) without specific permission from the Department. Working hours shall be between 8:30 AM and 4:00 PM
- ☒ The traveled-way and shoulders shall be kept clear of mud and other construction debris at all times during construction of the permitted facility.
- ☒ Non-construction equipment, vehicles, or office trailers shall not be allowed on the right of way during working hours.
- ☒ The right of way shall be left free and clear of equipment, material, and vehicles during non-working hours.

B. Explosives

- ☒ No explosive devices or explosive material shall be used within state right of way without proper license and approval of the Kentucky Department of Mines and Minerals, Explosive Division.

C. Other Safety Requirements

- ☒ All workers must wear OSHA conforming personal protection items at all times when work is performed on the KYTC right of way. All traffic control must conform to the latest edition of the Manual on Uniform Traffic Control Devices and Kentucky Department of Highways Standard Drawings

II. UTILITIES * Applies to Fully Controlled Access Highways ONLY

- ☐ *All work necessary within the right of way shall be performed behind a temporary fence erected prior to a boring operation.
- ☐ *The temporary woven wire fence shall be removed immediately upon completion of work on the right of way, and the control of access immediately restored to original condition, in accordance with applicable Kentucky Department of Highways Standard Drawings.
- ☐ *All vents, valves, manholes, etc., shall be located outside of the right-of-way.
- ☐ *Encasement pipe shall extend from right-of-way line to right-of-way line and shall be one continuous run of pipe. The encasement pipe shall be welded at all joints.
- ☐ The boring pit and tail ditch shall extend past the existing toe of slope or bottom of ditch line and shall be a minimum of 42 inches deep.

IV. RIGHT OF WAY RESTORATION

- ☐ Encasement pipe shall conform to current standards for highway crossings in accordance with the Permits Manual.
- ☐ Parallel lines shall be constructed between back slope of ditch line and right-of-way line and shall have a minimum of 42-inch cover above top of pipe or conduit.
- ☐ All pavement cuts shall be restored per attached encroachment terms.
- ☐ Aerial crossing of this utility line shall have a minimum clearance of _____ feet from the high point of the roadway to the low point of the line (calculated at the coefficient for expansion of 120 degrees Fahrenheit).
- ☐ The 30-foot clear zone requirement shall be met to the extent possible in accordance with the Permits Manual.
- ☐ Special requirements:

III. GENERAL**A. OSHA**

- ☒ Kentucky Occupational Safety and Health Standards for the construction industry, which has the effect of law, states in part: (Page 52, 1926.651, Specific Excavation Requirements) "Prior to opening an excavation, effort shall be made to determine whether underground installations, (sewer, telephone, water, fuel, electric lines, etc.) will be encountered, and if so, where such underground installations are located. When the excavation approaches the estimated location of such an installation, the exact location shall be determined, and when it is uncovered, proper supports shall be provided for the existing installation. Utility companies shall be contacted and advised of proposed work prior to the start of actual excavation."

B. Archaeological

- ☒ Whenever materials of an archaeological nature are discovered during the course of construction work or maintenance operations, contact shall be made immediately with the Division of Environmental Analysis, which maintains an archaeologist on staff, or with the Office of the State Archaeologist located at the University of Kentucky. Following this consultation, further action shall be decided on a case-by-case basis by the State Highway Engineer or the Transportation Planning Engineer or their designated representative.

C. Utilities in the Work Areas

- ☒ The permittee shall be responsible for any damage to existing utilities, and any utility modifications or relocations within state right of way necessary, as determined by the Department or by the owner of the utility, shall be at the expense of the permittee and subject to the approval of the Department.
- ☐ All existing manholes and valve boxes shall be adjusted to be flush with finished grade.

D. Environmental

- ☒ If the activity to which this permit relates disturbs one acre or more of land, you must obtain a KPDES KYR10 permit.

Websites

<https://eec.ky.gov/Environmental-Protection/Pages/default.aspx>

IV. RIGHT OF WAY RESTORATION

- ☒ All disturbed portions of the right of way shall be restored to grass as per Kentucky Department of Highways Standard Specifications for Road and Bridge Construction (latest edition). A satisfactory turf, as determined by the Department, shall be established by the permittee prior to release of indemnity. Sodding or seeding shall be as follows:

Slopes 3:1 or flatter

90% Kentucky 31 Tall Fescue

10% White Dutch Clover

Slopes steeper than 3:1

70% KY 31 Fescue

30% Partridge Pea

- ☒ Two tons of clean straw mulch per acre of seeding.
- ☒ Prior to seeding, the ground shall be prepared in accordance with Kentucky Department of Highways Standard Specifications for Road and Bridge Construction (latest edition).
- ☐ Substitutes for sod such as artificial turf, rocked mulch, or paved areas may be acceptable if they are aesthetically pleasing.
- ☐ All ditch-flow lines and all ditch-side slopes shall be sodded.
- ☒ Existing right of way markers shall not be disturbed, but if damaged in any way, they shall be entirely replaced by the permittee, with new markers in accordance with Kentucky Department of Highways Standard Drawings. Markers that are entirely removed shall be re-established in the proper locations by the permittee and to the satisfaction of the Department.
- ☐ Other right of way restoration requirements are as follows:

V. DRAINAGE

- ☐ All pipe shall be laid in a straight alignment, to proper grades, and with all materials and methods of installation including bedding and joint seating in accordance with Department Standard Specifications for Road and Bridge Construction (latest edition). Pipe shall not be covered until inspected by the Department and express permission obtained to make backfill.
- ☐ All gutter lines at the base of new curbs shall be on continuous grades, and pockets of water along with curbs or in entrance areas or other paved areas within the right of way shall not be acceptable.
- ☐ All drainage structures and appurtenances (manholes, catch basins, curbing, inlet basins, etc.) shall conform to Department specifications and shall be constructed in accordance with the Department Standard Drawings. Type required:

VI. Paving

- ☒ No bituminous pavement shall be installed within the right of way between November 15 and April 1, nor when the temperature is below 40 degrees Fahrenheit, without the express consent of the Department. No bituminous pavement shall be installed when the underlying course is wet.
- ☒ Paving within the right of way shall be as follows:
- | | | | |
|---|------------------------|-------------|-------------------|
| <input checked="" type="checkbox"/> Base (Type) | <u>DGA</u> | (Thickness) | <u>10 inches</u> |
| <input checked="" type="checkbox"/> Surface Base (Type) | <u>Asphalt Base</u> | (Thickness) | <u>3.0 inches</u> |
| <input checked="" type="checkbox"/> Finished Surface (Type) | <u>Asphalt Surface</u> | (Thickness) | <u>1.0 inch</u> |
- ☒ Existing pavement and shoulder material shall be removed to accommodate the above paving specifications.
- ☒ The finished surface of all new pavement within the right of way shall be true to the required slope and grade, uniform in density and texture, free of irregularities, and equivalent in riding qualities to the adjacent highway pavement or as determined by the Department of Highways.
- ☒ All materials and methods of construction, including base and subgrade preparation, shall be in accordance with Kentucky Department of Highways Standard Specifications for Road and Bridge Construction (latest edition).
- ☒ 48 hours notice to the Department is required prior to beginning paving operations.
- Phone: 606-307-6273 Name: Adam Dixon, PE
- ☒ To ensure proper surface drainage, the new pavement shall be flush with the edge of existing highway pavement and shall slope away from the existing edge of the pavement as specified in drawings.
- ☒ Existing edge of pavement shall be saw-cut to provide a straight and uniform joint for new pavement. An approved joint sealer, in accordance with Kentucky Department of Highways Standard Specifications (latest edition), shall be applied between new and existing pavements.

VII. SIDEWALKS SPECIFICATIONS *This dimension should be equal to the width of the sidewalk.**A. New Sidewalks**

- ☐ Sidewalks shall be constructed of Class A concrete (3,500 p.s.i. test), shall be * ___ feet in width, 8 inches in thickness across the entrances, and 4 inches in thickness across the remaining sections.
- ☐ Sidewalks shall have tooled joints not less than 1 inch in depth at four foot intervals*, and 1/2 premolded expansion joints extending entirely through the sidewalk at intervals not to exceed 50 feet.
- ☐ All materials and methods of construction, including curing, shall be in accordance with the Kentucky Department of Highways Standard Specifications for Road and Bridge Construction (latest edition).

B. Existing Sidewalks

- ☐ (Applicable if existing sidewalks are being relocated) Use of the sidewalk shall not be blocked or obstructed, and a usable walkway shall be maintained across the construction area at all times.
- ☐ All damaged sections of the sidewalks shall be entirely replaced to match existing sections.

VIII. DENSE GRADED SHOULDERS

- ☐ Any existing dense-graded aggregate shoulders in the entire frontage within the construction area, which have been disturbed or damaged or on which dirt has been placed or mud has been deposited or tracked, shall be restored to original condition by removal of all contaminated material and replaced to proper grade with new dense-graded aggregate.
- ☐ All new aggregate shoulders as specified in the plan shall consist of 5 inches of compacted dense-graded aggregate, 2^{1/2} pounds per square yard of calcium chloride.
- ☐ All dense-graded aggregate shoulders shall slope away from the new edge of pavement at the rate of 3/4 inch per foot.

IX. CURBING

A. Bituminous Curbs

- ☐ Bituminous concrete curbs shall be given a paint coat of asphalt emulsion.
- ☐ The surface under the bituminous concrete curb shall be tacked with asphalt emulsion.
- ☐ All bituminous concrete curbs shall be constructed of a Class I bituminous concrete mixture as specified by official Department of Highways specifications.
- ☐ All bituminous curbs shall be rolled curb, with a minimum base width of 8 inches and a minimum height of _____ inches. The top of the curb shall be constructed in such a manner as to guarantee a uniform rolled effect throughout the entire run.

B. Concrete Curbs

- ☐ All curbs or curb and gutter shall be constructed of Class A concrete (3,500 p.s.i. test) and shall be uniform in height, width, and alignment, true to grade, and satisfactory in finish and appearance as determined by the Department. All materials and methods of construction, including curing, shall be in accordance with Department of Highways Standard Specifications for Road and Bridge Construction (latest edition).
- ☐ All concrete curbs shall be 6 inches in width, extend _____ inches above finished grade and 12 inches below finished grade, with all visible edge rounded to 1/2 inch radii.
- ☐ All concrete curbs shall have expansion joints constructed at intervals of not more than 30 feet, and 1/2 inch premolded expansion joint material (cut to conform to the curb or to the curb and gutter section) shall be used in each expansion joint.
- ☐ The last _____ feet of all concrete curbs are to be tapered down to finished grade.

X. RIGHT-OF-WAY FENCE REPLACEMENT

- ☐ The replacement fence shall be a height of at least 48 inches and shall be of sufficient density to contain all animals (if applicable).
- ☐ The replacement fence shall be a minimum of 1 foot outside the right-of-way line. The fence materials and design shall meet accepted industry standards.
- ☐ The permittee shall be required to maintain the fence in a high state of repair.
- ☐ The existing fence shall be removed by permittee and stored at the Department's maintenance storage yard for future reuse by the Department.
- ☐ The control of access shall not be diminished as a result of the removal or replacement of the fence.

IX. MISCELLANEOUS

- ☐ Miscellaneous:

NOTICE TO PERMITTEE

THE PERMITTEE AGREES THAT ALL WORK WITHIN THE EXISTING RIGHT OF WAY SHALL BE DONE IN ACCORDANCE WITH THE PLANS AS APPROVED AND PERMITTED BY AN ENCROACHMENT PERMIT. ANY CHANGES OR VARIANCES MADE AT THE TIME OF CONSTRUCTION WITHOUT WRITTEN APPROVAL FROM THE DEPARTMENT OF HIGHWAYS SHALL BE REMOVED BY THE PERMITTEE AT NO EXPENSE TO THE DEPARTMENT OF HIGHWAYS AND SHALL BE REDONE BY THE PERMITTEE TO CONFORM WITH THE APPROVED PLANS.

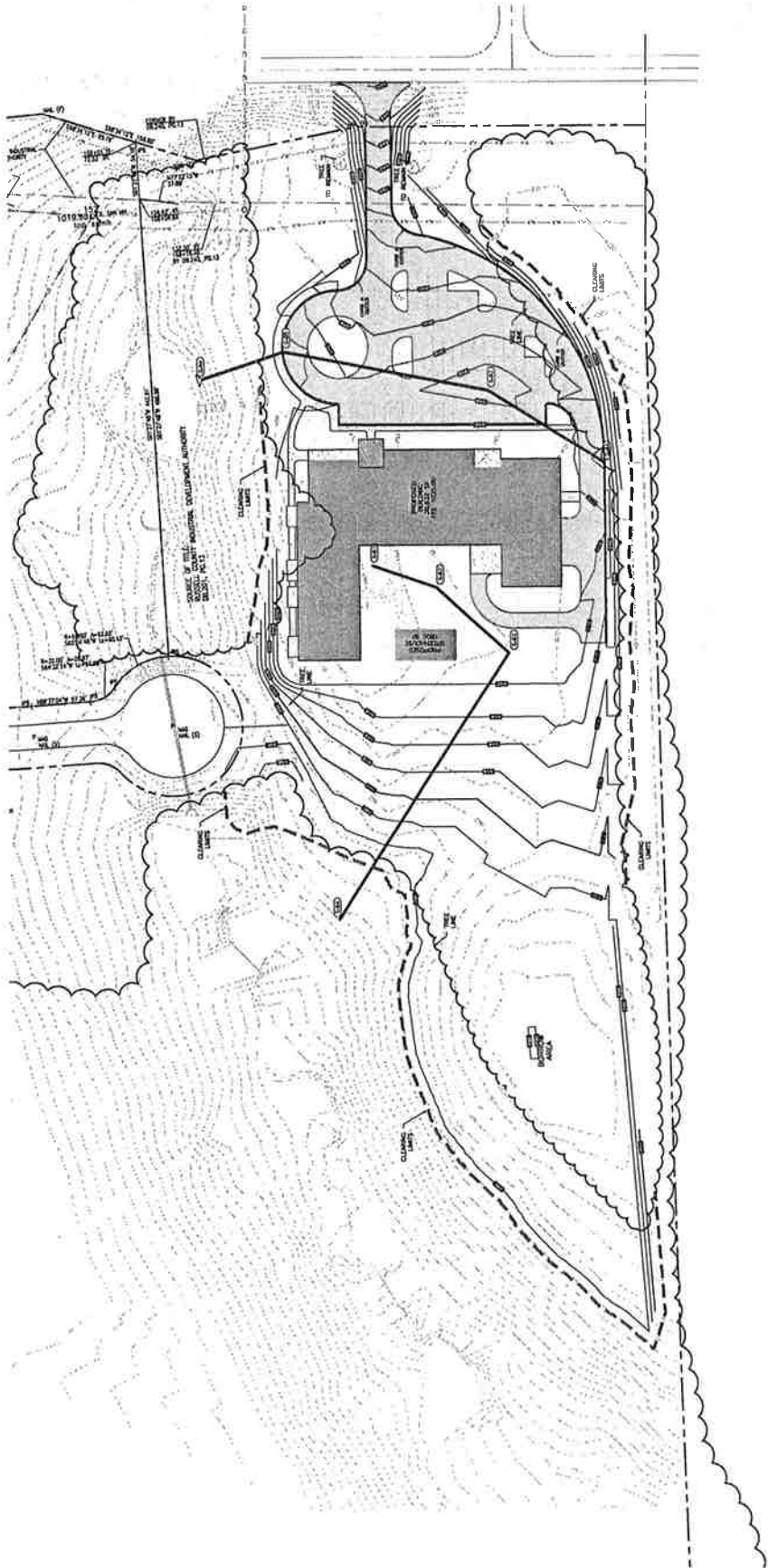
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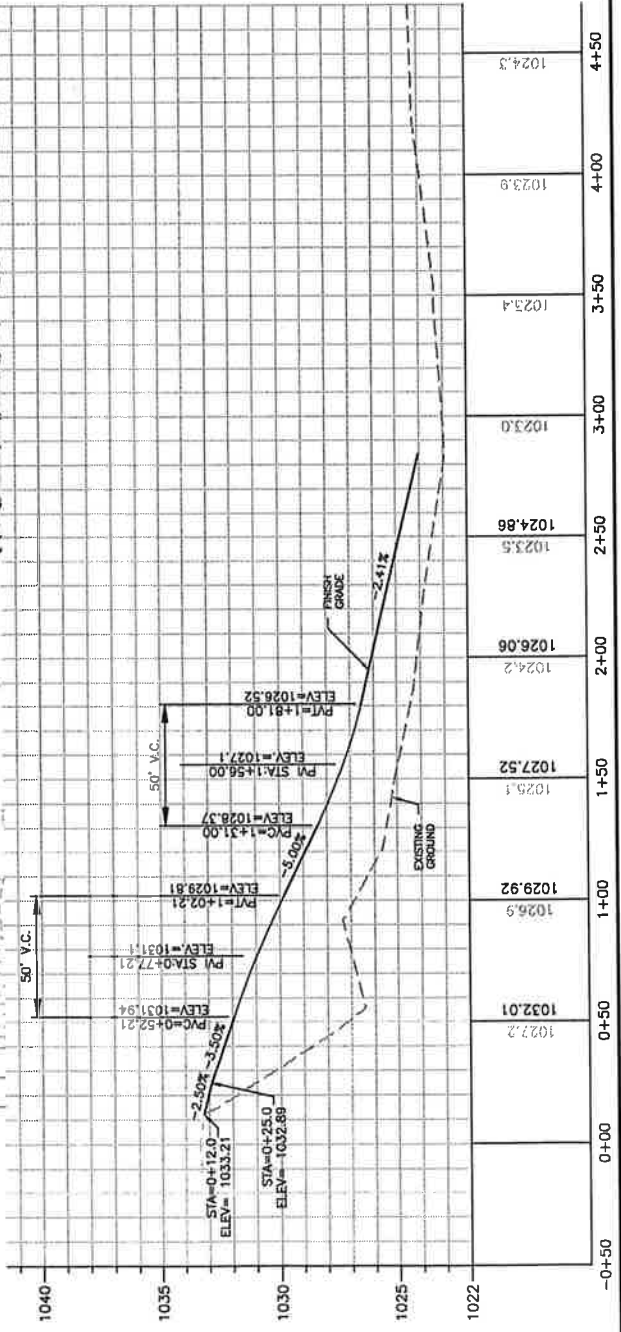
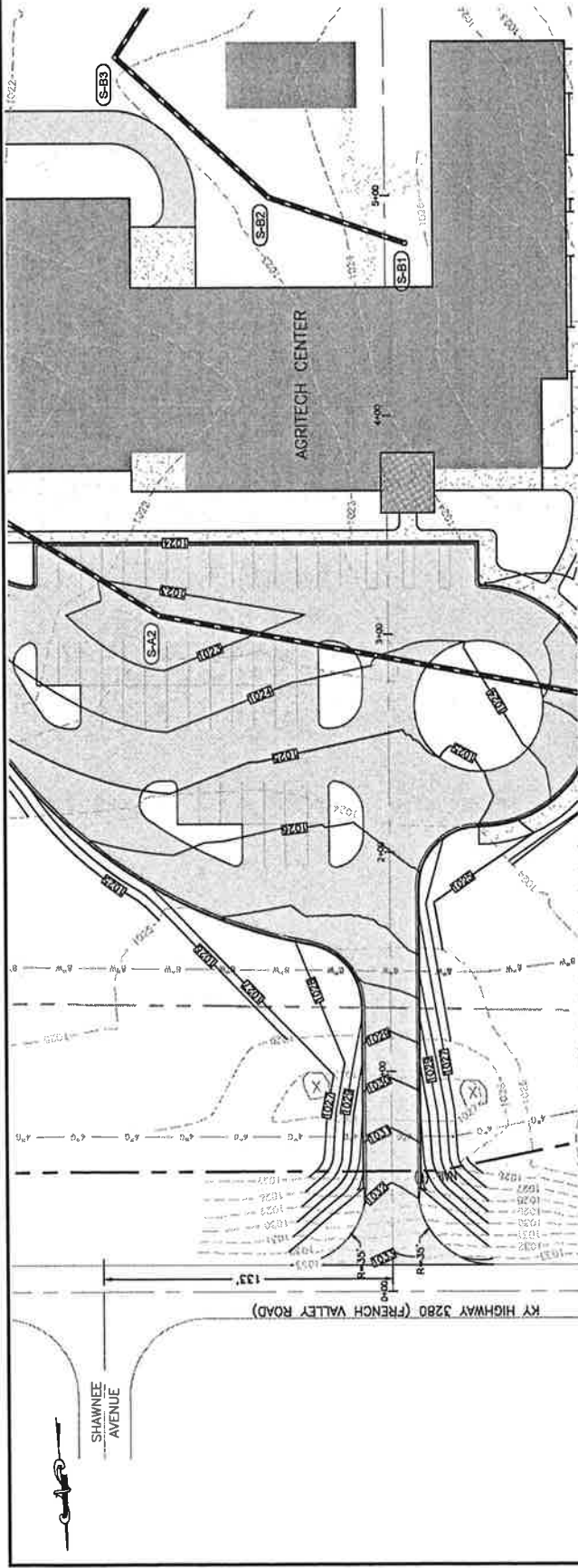
625 Washington Hwy
Lexington, KY 40503
Phone (606) 223-5864
Fax (606) 223-5864

PROJECT NO.	DESIGNED BY	CHECKED BY	DATE
	GAR	JRM	JULY 2023
SCALE	AS NOTED		

DATE	REVISION

THE SEED ACADEMY
LAKE CUMBERLAND REGIONAL AGRITECH CENTER
SITE PLAN LAYOUT SKETCH
RUSSELL SPRINGS, KENTUCKY





THE SEED ACADEMY
LAKE CUMBERLAND REGIONAL
AGRITECH CENTER
ENTRANCE DRIVE PLAN AND PROFILE
RUSSELL SPRINGS, KENTUCKY



SCALE: 1" = 50'
JULY 12, 2022

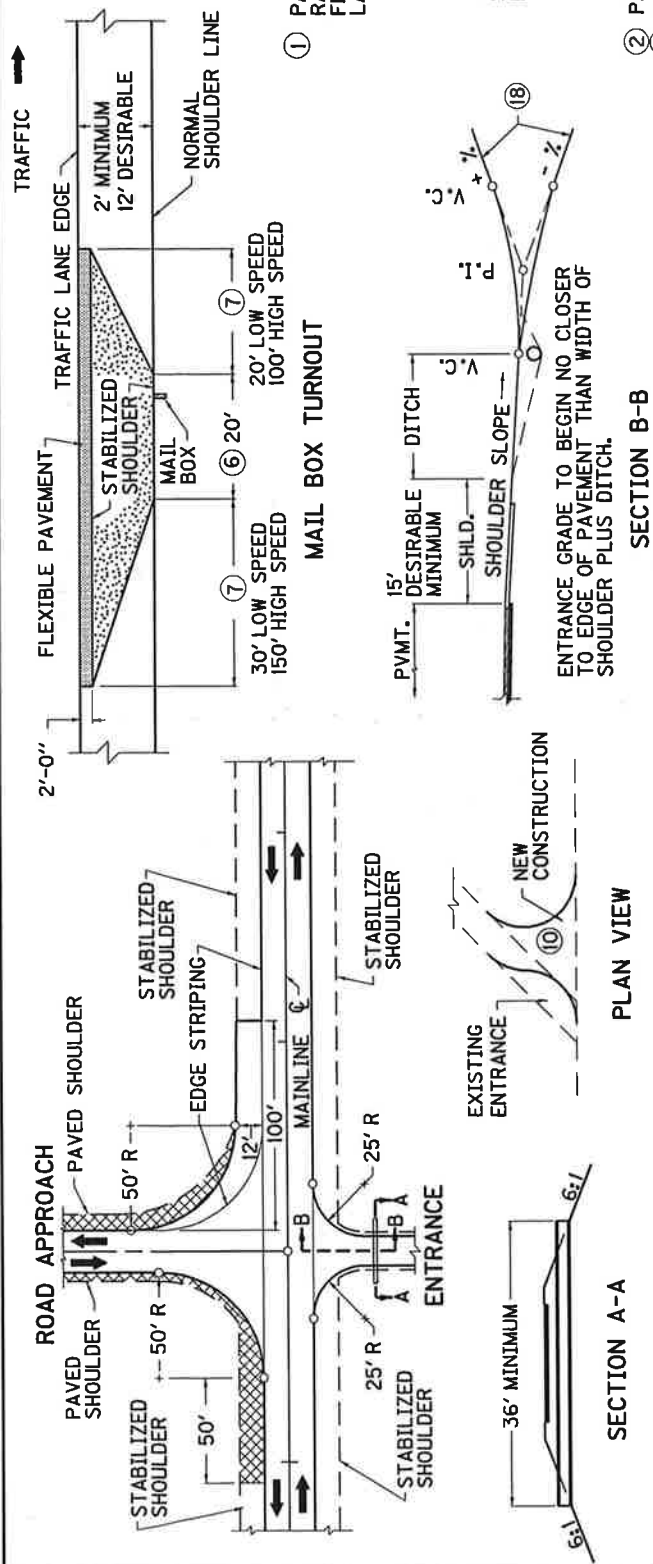


**Engineers
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OF KENTUCKY, INC.

624 Wellington Way
Lexington, KY 40503
www.nselex.com

Phone: (859)223-5664
Fax: (859)223-2807



MAIL BOX TURNOUT

- ⑥ ADD 2'-0" FOR EACH ADDITIONAL MAIL BOX.
- ⑦ HIGH SPEED EQUALS 50 MPH OR GREATER. LOW SPEED EQUALS LESS THAN 50 MPH.
- ⑧ THE 2'-0" WIDE FLEXIBLE PAVEMENT FOR THE LENGTH AS SHOWN, OR AS DETERMINED BY THE ENGINEER, SHALL BE APPLIED TO ALL MAIL BOX TURNOUTS. THE PAVEMENT DESIGN SHALL BE AS SHOWN ON THE PLANS OR AS APPROVED BY THE ENGINEER.
- ⑨ FOR STABILIZED SHOULDERS, THIS AREA SHALL RECEIVE THE SAME TREATMENT AS THAT FOR ADJOINING STABILIZED SHOULDERS. FOR EARTH SHOULDERS THIS AREA SHALL RECEIVE 3" TO 5" OF COMPACTED DENSE GRADED AGGREGATE BASE, BANK GRAVEL, OR TRAFFIC BOUND BASE.

APPROACHES AND ENTRANCES

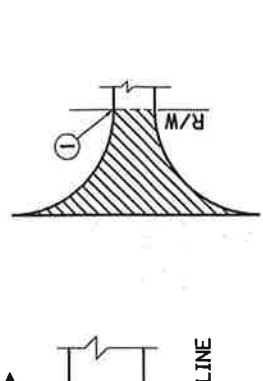
- ⑩ IF FEASIBLE, ALL APPROACHES AND ENTRANCES SHALL INTERSECT SHOULDER LINE AT RIGHT ANGLES. IF NOT AT RIGHT ANGLES, PIPE LENGTH SHALL BE INCREASED TO PROVIDE ACCURATE RADIUS.
- ⑪ ROAD APPROACH ILLUSTRATION IS FOR MAINLINE ROAD, ADT 400 OR GREATER. PAVED SHOULDER PORTION SHOWN SHALL ONLY BE APPLICABLE WHERE THE MAINLINE SPECIFIES STABILIZED OR PAVED SHOULDERS. IF THE MAINLINE SHOULDER IS PAVED, THIS SHOULDER PORTION SHALL ALSO BE PAVED.
- ⑫ WHEN THE MAINLINE ADT IS UNDER 400, USE A 25' RADIUS WITH NO DECELERATION WIDTH PROVIDED.
- ⑬ THE PAVEMENT ON ENTRANCES AND APPROACHES THAT IS DISTURBED DURING NEW CONSTRUCTION OPERATIONS SHALL BE REPLACED WITH A PAVEMENT EQUIVALENT TO THE EXISTING PAVEMENT, REGARDLESS OF THE SURFACE MATERIAL USED ELSEWHERE. THE PAVEMENT DESIGN SHALL BE AS SHOWN ON THE PLANS OR AS APPROVED BY THE ENGINEER.
- ⑭ THE RADIUS ON COUNTY OR SECONDARY ROADS SHALL NOT BE LESS THAN 25' MEASURED TO THE INSIDE EDGE OF THE SURFACE. EACH ADDITIONAL FOOT OF SURFACE WIDTH WILL REQUIRE AN ADDITIONAL FOOT OF PIPE.
- ⑮ PIPE ILLUSTRATION IS BASED ON THE USE OF 15" PIPE. LARGER SIZES MAY BE INSTALLED WITH APPROPRIATE MODIFICATIONS. PIPES SMALLER THAN 15" DIAMETER ARE NOT TO BE USED EXCEPT IN SPECIAL CASES, WHEN SPECIFICALLY AUTHORIZED.
- ⑯ IN CUT SECTION, SIGHT DISTANCE SHALL BE PROVIDED ON ENTRANCES AND APPROACHES BY DAYLIGHTING THE CUT FROM THE POINTS WHERE THE RADIUS BEGINS, TO POINTS NOT LESS THAN 100' ON EACH OF THE INTERSECTING ROADWAY.
- ⑰ MINIMUM PAVED AREAS FOR ENTRANCES AND APPROACHES. THESE PAVED AREAS MAY BE EXTENDED TO TOUCHDOWN OR TIE-DOWN POINT PROVIDED THE EXISTING IS PAVED.
- ⑱ MAXIMUM GRADE FOR ENTRANCES 50' OR GREATER IN LENGTH: MOUNTAINOUS TERRAIN - 20%, ROLLING TERRAIN - 16% AND FLAT TERRAIN - 12%.

SECTION A-A

PLAN VIEW

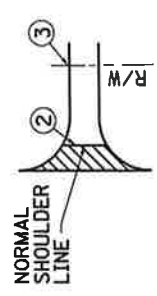
SECTION B-B

~ NOTES ~



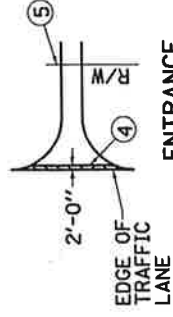
- ① PAVE TO R/W LINE OR END OF RADIUS, WHICHEVER IS FURTHER FROM THE EDGE OF TRAFFIC LANE.

ROAD AND STREET APPROACHES



- ② PAVED TO SHOULDER LINE
- ③ SURFACE TO R/W LINE OR TOUCHDOWN WITH TRAFFIC BOUND BASE.

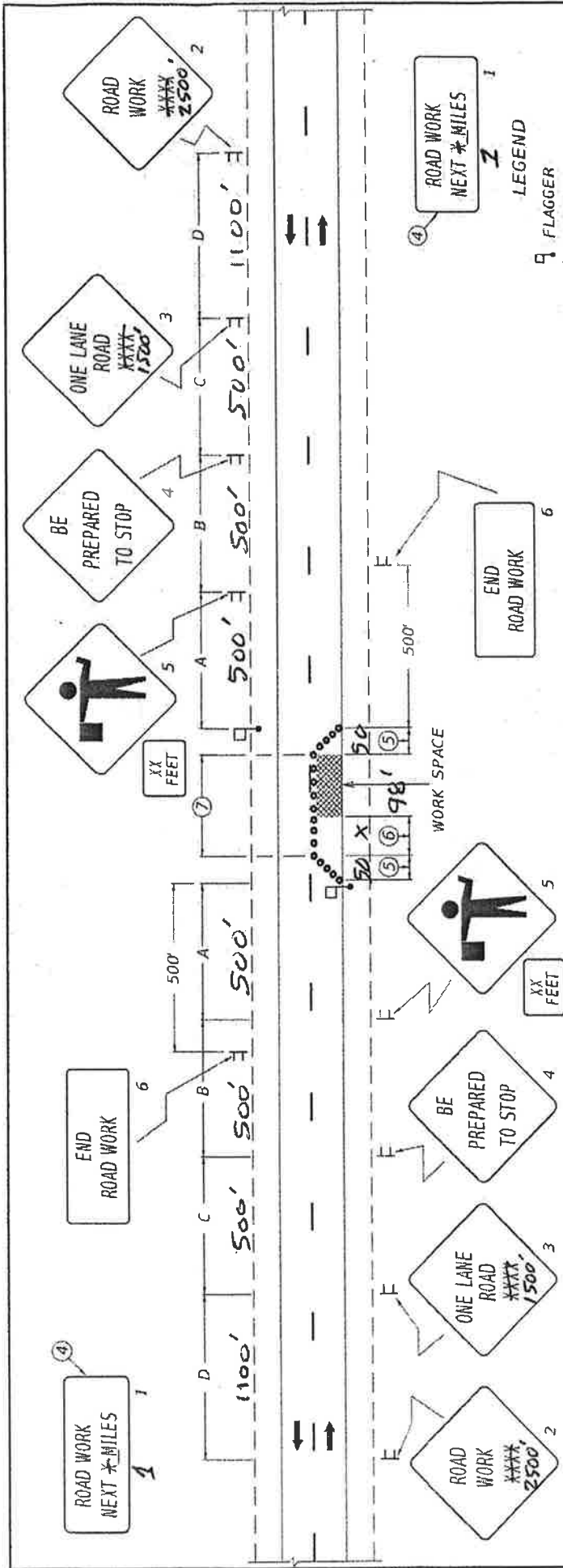
ENTRANCE (RESIDENTIAL AND COMMERCIAL)



ENTRANCE (FARM FIELD)

- ④ PAVE AS SHOWN WITH FLEXIBLE PAVEMENT.
- ⑤ SURFACE TO R/W LINE WITH TRAFFIC BOUND BASE.

KENTUCKY DEPARTMENT OF HIGHWAYS	STANDARD DRAWING NO. RPM-110-07
APPROVED: <i>[Signature]</i> DATE: 12-01-15	SUBMITTED: <i>[Signature]</i> DATE: 12-01-15
APPROACHES, ENTRANCES AND MAIL BOX TURNOUT	



NOTES

1. THE SIZE OF SIGNS 2 THRU 5 SHALL BE 48" X 48" WITH 30" X 24" SUPPLEMENTAL PLAQUES FOR EXPRESSWAYS/FREEWAYS. THE MINIMUM SIZE OF SIGNS 2 THRU 5 SHALL BE 36" X 36" WITH 24" X 18" SUPPLEMENTAL PLAQUES FOR OTHER ROADWAYS. SIGN NOS. 1 AND 6 SHALL BE 48" X 24" FOR EXPRESSWAYS/FREEWAYS AND 36" X 18" FOR OTHER ROADWAYS. A FREEWAY IS DEFINED AS A DIVIDED HIGHWAY WITH FULL CONTROL OF ACCESS. AN EXPRESSWAY IS DEFINED AS A DIVIDED HIGHWAY WITH PARTIAL CONTROL OF ACCESS.
2. THE FLAGGERS SHALL BE IN SIGHT OF EACH OTHER OR IN DIRECT COMMUNICATION AT ALL TIMES. FLAGGER STATIONS SHALL BE LOCATED FAR ENOUGH IN ADVANCE OF THE ACTIVITY AREA SO THAT APPROACHING ROAD USERS WILL HAVE SUFFICIENT DISTANCE TO STOP BEFORE ENTERING THE WORK SPACE. ILLUMINATION SHALL BE PROVIDED TO MARK FLAGGER STATIONS AT NIGHT.
3. DRUMS SHALL BE USED IN LIEU OF CONES IF CLOSURE EXTENDS INTO NIGHTTIME HOURS. GRABBER CONES MAY BE USED IN LIEU OF DRUMS IF THE USE OF DRUMS WOULD RESULT IN LANES THAT ARE TOO NARROW OR AN UNACCEPTABLE SITUATION BASED ON ENGINEERING JUDGMENT.
4. SIGN NO. 1 SHOULD BE INSTALLED AT THE LIMITS OF THE PROJECT WHEN THE CONSTRUCTION ZONE IS LONGER THAN TWO MILES IN LENGTH. THE DISTANCE SHOWN SHALL BE STATED TO THE NEAREST WHOLE MILE.
5. TAPERS SHALL BE 50' (MIN) TO 100' (MAX) IN LENGTH. SPACING OF CHANNELIZING DEVICES SHOULD BE 20' THRU THE TAPER AREAS.
6. BUFFER SPACE (OPTIONAL). IF USED, THE BUFFER SPACE SHOULD BE EXTENDED SO THAT THE TWO-WAY TRAFFIC TAPER IS PLACED BEFORE A HORIZONTAL OR CREST VERTICAL CURVE TO PROVIDE ADEQUATE SIGHT DISTANCE FOR THE FLAGGER AND A QUEUE OF STOPPED VEHICLES. REFER TO TABLE 6C-2 OF THE MUTCD FOR GUIDANCE ON BUFFER SPACE LENGTH.
7. SPACING OF CHANNELIZING DEVICES THRU THE ACTIVITY AREA SHOULD BE 80'. ON ROADWAYS WITH WIDTHS LESS THAN 20 FEET, CHANNELIZING DEVICES MAY BE OMITTED THRU THE ACTIVITY AREA BASED ON ENGINEERING JUDGMENT.

BID ITEMS AND UNIT TO BID

EACH

REFER TO SECTION 112 OF STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, CURRENT EDITION.

SIGNING AND SPACING TABLE

ROAD TYPE	A	B	C	D
EXPRESSWAY/ FREEWAY	1000'	500'	1100'	2600'
SP. LT. \geq 45 MPH*	500'	500'	500'	1100'
SP. LT. \leq 40 MPH*	250'	250'	250'	250'

*NOTE: USE NORMAL POSTED SPEED LIMIT

RUSSELL CO. AGRITECH
ENTRAUCE

DRAWING NOT TO SCALE

KENTUCKY

DEPARTMENT OF HIGHWAYS

LANE CLOSURE
TWO-LANE HIGHWAY

STANDARD DRAWING NO. TTC-100-05

DATE: 02-26-20

APPROVED: 02-26-20

Moren, Conley W (KYTC-D08)

From: Glen Ross <glenross@mselex.com>
Sent: Thursday, July 28, 2022 2:38 PM
To: Moren, Conley W (KYTC-D08)
Cc: 'James manley'; Jones, James E (KYTC-D08); Dixon, Adam C (KYTC-D08); 'Lucas Witt'
Subject: RE: Russell County IDA - entrance permit for driveway on French Valley Road
Attachments: _Design-070222A for DOT-Site Plan Sketch.pdf; Sign Placement Aerial-page-001.jpg; ttc 100 RCIDA.pdf

****CAUTION** PDF attachments may contain links to malicious sites. Please contact the COT Service Desk ServiceCorrespondence@ky.gov for any assistance.**

Conley

See the answers to your questions in red below. Let me know if more is needed.

Thank you,

Glen A. Ross, P.E.
President
MSE of Kentucky, Inc.
624 Wellington Way
Lexington, Ky 40503
859-223-5694 (Bus.)
859-223-2607 (Fax)
glenross@mselex.com
www.mselex.com

From: Moren, Conley W (KYTC-D08) <Conley.Moren@ky.gov>
Sent: Friday, July 22, 2022 3:15 PM
To: Glen Ross <glenross@mselex.com>
Cc: James manley <jrmanley@outlook.com>; Jones, James E (KYTC-D08) <JamesE.Jones@ky.gov>; Dixon, Adam C (KYTC-D08) <Adam.Dixon@ky.gov>
Subject: RE: Russell County IDA - entrance permit for driveway on French Valley Road

Glen,
Thank you for the submittal. In addition what has been supplied we will require the proposed traffic control that complies with the Manual on Uniform traffic Control Devices and the Department's standard drawings (i.e. Lane Closure Two Lane Highway TTC-100-05) for the entrance construction that impacts the French Valley Road traffic,

the site topography sheet so we may confirm the storm water flows in relation to the right of way, See attached exhibit. The project site is 6' lower than French valley Road (el. 1033 down to el. 1027) and all drainage from the site is directed to the west and south away from French Valley Road. A storm sewer shown at the front of the building carries stormwater from the front of the site to the west into a creek in the industrial park that flows to the south away from the highway.

the size of the building in square feet The "Seed Academy" will have 31,050 sq. ft. It has 3 labs and 5 classrooms. The remaining space is support/office space.

and the maximum number of students or capacity so we may ascertain the traffic generation potential, According to Dr. Ford, Superintendent of Russell County Schools, the high school has 5 class periods per day. The Seed academy will operate as a remote facility for the high school to conduct agri-science education. A bus will bring students from the high school to the Seed Academy and return each period that students have classes there. It is not yet know if all 5 periods would have students attending the Academy. So the maximum traffic is 5 bus trips and return to the high school per school day. There will be 3 instructors at the Academy who will likely drive their own vehicles. It is hoped, but not yet established, that the Somerset Community College will have some students enter the program, perhaps up to five. They would likely drive their own vehicles. A cleaning service would account for another vehicle each day.

French Valley Road is a low volume road, with the AADT in 2021 for this area (Sta. 756) being 1,936.

the pavement structure of the entrance on right of way,

Heavy Duty Pavement For entrances, main roads, main drives and all loading dock areas.

All asphalt to be mixed, placed, and compacted in accordance with Kentucky Transportation Cabinet Standard Specifications. Also, the dense graded aggregate (DGA) to be placed and compacted in accordance with KyTC Specifications. PG 22 OF 25

Surface Course 1"

Asphalt Base Course 3"

Base Material (DGA) 10"

the proposed traffic markings and signage to be installed by the applicant,

There will be a stop bar at the driveway exit onto French Valley Road and a dividing line on the entrance drive to separate in and out vehicles. A monument sign identifying the Seed Academy will be erected off the highway right-of-way at a later date.

and the entrance curbing needs to end at the property line with clear labels for the benefit of the contractor. There will be no curbs on the highway right of way. The entrance drive will be sloped away from the highway and drainage will sheet flow down the entrance drive slope as shown on the entrance drive profile submitted with the encroachment permit. All as shown on the attached exhibit and the permit exhibit.

Upon completion of the encroachment review, we can then determine the appropriate indemnity amount. The Russell County Industrial Authority (Owner/applicant) is an agency of the County and City government. The facility will be operated under lease from Russell county IDA by the Russell County Public School system.

Please let me know if you have any questions.

Conley Moren, P.E.

TEBM Engineering Support

District 8

Somerset KY

1-502-764-0347 Office

1-606-416-4722 Cell

From: Glen Ross <glenross@mselex.com>

Sent: Thursday, July 21, 2022 6:06 PM

To: Moren, Conley W (KYTC-D08) <Conley.Moren@ky.gov>

Cc: James manley <jrmanley@outlook.com>

Subject: Russell County IDA - entrance permit for driveway on French Valley Road

****CAUTION** PDF attachments may contain links to malicious sites. Please contact the COT Service Desk ServiceCorrespondence@ky.gov for any assistance.**

Conley

Attached is a request for a permit to construct a new driveway into the Lake Cumberland Regional Industrial Park (formerly the French Valley Industrial park) on French valley Road to serve a proposed new agricultural academy that will be owned by the industrial authority. Traffic is expected to be minimal with 2 school bus trips per day bringing high school students to the academy for classes and then return to the high school. There will be 6-8 instructors and administrators and perhaps a few students who will drive directly to the facility. I have attached a photo of the entrance location viewed from French Valley Road.

Please let me know if you have questions.

Thank you,

Glen A. Ross, P.E.
President
MSE of Kentucky, Inc.
624 Wellington Way
Lexington, Ky 40503
859-223-5694 (Bus.)
859-223-2607 (Fax)
glenross@mselex.com
www.mselex.com



COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET

transportation.ky.gov

Andy Beshear
GOVERNOR

Jim Gray
SECRETARY

Russell County Industrial Development
PO Box 1068
Jamestown, KY 42629

Subject: Pulaski County
KY 39
MP 104-3280-4.760
Permit 08-2022-00170

Dear Sir:

The attached is your copy of the approved encroachment permit application. One copy is to be submitted to your contractor. This permit is to remain on the project until the permitted work is complete.

You are to shape and seed any disturbed areas on the State's right of way. All work and materials are to comply with the Department's Standard Specification for Road and Bridge Construction- 2019 Edition. Signs, barricades, lights, etc. if required, are to be installed in accordance with the Manual on Uniform Traffic Control Devices.

Please notify this office when permitted work begins. When work has been completed, the Notice of Completion of Encroachment Permit Work must be completed and returned so an inspection can be made by personnel from this office. If all work has been completed satisfactorily, your indemnity will then be released.

Yours truly,

A handwritten signature in cursive script, appearing to read "Conley Moren", written over a horizontal line.

Conley Moren, P.E.
Engineering Support TEBM
District 8- Somerset

9/7/2022

Date

JJ/cm
Attachments

SECTION 01010 - SUMMARY OF WORK

PART 1 - GENERAL

1.01 SUMMARY OF WORK

- A. Work covers construction of the new Seed Academy Lake Cumberland Regional AgriTech Center in Russell Springs, Kentucky.
- B. Encroachment Permit 08-2022-00170 is included in this specification front end documents for property address 531 French Valley Rd, Russell Springs, KY 42642.
- C. Related requirements specified elsewhere:
 - 1. Submittals- Section 01300
 - 2. Temporary Facilities- Section 01500
 - 3. Project Closeout - Section 01700
- C. Contractor's Duties:
 - 1. Except as specifically noted, provide and pay for:
 - a. Labor, materials, tools, and equipment.
 - b. Permits.
 - c. Fees.
 - d. Licenses.
 - e. Taxes.
 - f. Special Inspections
 - 2. Give required notices.
 - 3. Comply with codes, ordinances, rules, regulations, orders, and other legal requirements of public authorities which bear on performance of work.
 - 4. Promptly submit written notice to Architect of observed variance of Contract Documents from legal requirements.
 - 5. Contractor shall verify all grades, lines, levels, and dimensions indicated on the drawings and shall report any inconsistencies before commencing work.
 - 6. Each Sub Contractor shall be responsible for the layout for their specific phase of work.

1.02 CONTRACT (OWNER AND GENERAL CONTRACTOR)

- A. Construction work shall be under a single lump sum contract, which shall include all general construction, steel, concrete, mechanical, electrical, plumbing and site work, etc.

1.03 CONTRACTORS' USE OF PREMISES

- A. Confine operations at site to areas permitted by:
 - 1. Law.
 - 2. Ordinances.
 - 3. Permits.
 - 4. Contract Documents.
 - 5. Owner.
- B. Do not unreasonably encumber site with materials or equipment.
- C. Do not load structure with weight that will endanger structure.
- D. Assume full responsibility for protection and safekeeping of products stored on site.
- E. Move any stored products which interfere with operations of the Owner.

END OF SECTION

SECTION 01020 - ALLOWANCES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division - 1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

- A. Requirements for the work of allowances are shown and specified.

PART 2 - PRODUCTS

Not Applicable.

PART 3 - EXECUTION

3.01 SCHEDULE OF ALLOWANCE

- A. The Bidder is to include the following allowance in their bid.

- 1. Allowance No. 1 - Testing/Inspections. The architect/engineer will designate a testing/inspection representative to provide independent testing and inspection of the contractor's work. Compaction testing, normal concrete strength testing, bolt tightening, paving testing, review of utility and system testing and inspection of general installations and adjustments are included.

TOTAL ALLOWANCE #1\$30,000

END OF SECTION

SECTION 01027 - APPLICATIONS FOR PAYMENT REQUIREMENTS OF CONTRACTOR

PART 1 - GENERAL

1.01 SECTION INCLUDES:

- A. Procedures of Contractor for preparation and submittal of applications for payment.

1.02 RELATED SECTIONS

- A. Document 00500 - Agreement: Contract Sum amounts of progress payments and retainages.
- B. Section 01028 - Modification Requirements: Procedures for changes to the Work.
- C. Section 01300 - Submittals: Submittal procedures.
- D. Section 01700 - Contract Closeout - Final Payment

1.03 FORMAT

- A. For each item, provide a column for listing each of the following:
 - 1. Item Number.
 - 2. Description of Work.
 - 3. Scheduled Values.
 - 4. Previous Applications.
 - 5. Work in Place and Stored Materials under this Application.
 - 6. Authorized Change Orders.
 - 7. Total Completed and Stored to Date of Application.
 - 8. Percentage of Completion.
 - 9. Balance to Finish.
 - 10. Retainage.

1.04 PREPARATION OF APPLICATIONS

- A. Present required information in typewritten form on specified AIA Documents G702 and G703 with USDA RD Attachments.
- B. Execute certification by signature of authorized officer.
- C. 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.

- D. List each authorized Change Order as an extension on AIA G703 Continuation Sheet, listing Change Order number and dollar amount as for an original item of Work.
- E. Prepare Application for Final Payment as specified in Section 01700.
- F. Submit partial release of liens waiver for all work completed to date with each payment application.
- G. Submit up-to-date (revised) construction schedule.

1.05 SUBMITTAL PROCEDURES

- A. Submit three copies of each Application for Payment.
- B. Submit an updated construction schedule with each Application for Payment.
- C. Payment Period: Submit at intervals stipulated in the Agreement.
- D. Submit with transmittal letter as specified for Submittals in Section 01300.

1.06 DETAILED COST BREAKDOWN

- A. Upon award of contract, Contractor will have seven working days to generate a finalized cost breakdown of the project.

1.07 SUBSTANTIATING DATA

- A. When Architect/Engineer requires substantiating information, Contractor shall submit data justifying dollar amounts in question.
- B. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

PART 2 - PRODUCTS

Not Applicable.

PART 3 - EXECUTION

Not Applicable.

END OF SECTION

SECTION 01028 - MODIFICATION REQUIREMENTS OF CONTRACTOR

PART 1 - GENERAL

1.01 SECTION INCLUDES:

- A. Submittals.
- B. Documentation of change in Contract Sum and Contract Time.
- C. Change procedures.
- D. Construction Change Directive.
- E. Stipulated Sum change order.
- F. Execution of change orders.
- G. Correlation of Contractor submittals.

1.02 SUBMITTALS

- A. Submit name of the individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.
- B. Change Order Forms: AIA G701 Change Order.

1.03 DOCUMENTATION OF CHANGE IN CONTRACT SUM AND CONTRACT TIME

- A. Maintain detailed records of work performed. Provide full information required for evaluation of proposed changes, and to substantiate costs of changes in the Work.
- B. Document each quotation for a change in cost or time with sufficient data to allow evaluation of the quotation.
- C. Provide additional data to support computations:
 - 1. Quantities of products, labor, and equipment.
 - 2. Taxes, insurance, and bonds.
 - 3. Overhead and profit.
 - 4. Justification for any change in Contract Time.
 - 5. Credit for deletions from Contract, similarly documented.
- D. Support each claim for additional costs, and for work performed, with additional information:
 - 1. Origin and date of claim.
 - 2. Dates and times work was performed, and by whom.
 - 3. Time records and wage rates paid.
 - 4. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

1.04 CHANGE PROCEDURES

- A. The Architect/Engineer will advise of minor changes in the Work not involving an adjustment to Contract Sum/Price or Contract Time as authorized by AIA A201, 2017 Edition, Paragraph 7.4 by issuing supplemental instructions on AIA Form G710.
- B. The Architect/Engineer may issue a Proposal Request which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change. Contractor will prepare and submit an estimate within seven (7) days.

1.05 CONSTRUCTION CHANGE DIRECTIVE

- A. Architect/Engineer may issue a document, signed by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
- B. The document will describe changes in the Work, and will designate method of determining any change in Contract Sum or Contract Time.
- C. Contractor shall include in his costs any and all costs associated with contract documents modification required by the Architect/Engineer as a part of modifications.
- D. Promptly execute the change in Work.

1.06 STIPULATED SUM CHANGE ORDER

- A. Based on Proposal Request and Contractor's fixed price quotation.

1.07 CHANGE ORDER

- A. Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.
- B. Architect/Engineer will determine the change allowable in Contract Sum and Contract Time as provided in the Contract Documents pending Owner approval.
- C. Maintain detailed records of work performed.
- D. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

1.08 EXECUTION OF CHANGE ORDERS

- A. Execution of Change Orders: Architect/Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

1.09 CORRELATION OF CONTRACTOR SUBMITTALS

- A. 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.
- B. 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.
- C. Promptly enter changes in Project Record Documents.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01041 - PROJECT COORDINATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Project coordination.
- B. Construction mobilization.
- C. Schedules.
- D. Submittals.
- E. Coordination drawings.
- F. Closeout procedures.

1.02 RELATED SECTIONS

- A. Section 00800 - Supplementary Conditions
- B. Section 01011 - Summary of Project: Work sequence.
- C. Section 01700 - Contract Closeout: Contract Closeout Procedures.

1.03 CONSTRUCTION MOBILIZATION

- A. Comply with procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- B. Comply with instructions for use of temporary utilities and construction facilities.
- C. Coordinate field engineering and layout work.

1.04 SCHEDULES

- A. Submit preliminary progress schedule in accordance with Section 01310.
- B. After review, revise and resubmit schedule to comply with revised Project schedule. Submit revised or up-to-date schedule with each application for payment.
- C. During progress of work revise and resubmit as directed.

1.05 SUBMITTALS

- A. Provide submittals for review and transmittal to Architect/Engineer.
- B. Submit applications for payment on AIA G702 forms for review, and for transmittal to Architect/Engineer.
- C. Submit requests for interpretation of Contract Documents, and obtain instructions through the Architect/Engineer.
- D. Process requests for substitutions, and change orders.
- E. Deliver closeout submittals for review and preliminary inspection reports, for transmittal to Architect/Engineer.

1.06 COORDINATION DRAWINGS

- A. Provide information required by Architect/Engineer for preparation of coordination drawings.
- B. Review drawings prior to submission to Architect/Engineer.

1.07 CLOSEOUT PROCEDURES

- A. Notify Architect/Engineer when Work is considered ready for Substantial Completion.
- B. Comply with Architect/Engineer's instructions to correct items of work listed in executed Certificates of Substantial Completion and for access to Owner occupied areas.
- C. Notify Architect/Engineer when Work is considered finally complete.
- D. Comply with instructions for completion of items of Work determined by Architect/Engineer's final inspection.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01045 - CUTTING AND PATCHING REQUIREMENTS OF CONTRACTOR

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Requirements and limitations for cutting and patching of Work, including:
 - 1. Cutting, fitting, or patching that may be required to complete the work or make its several parts fit together properly.
 - 2. Uncovering work to provide for installation of ill-timed work.
 - 3. Removing and replacing defective work.
 - 4. Removing and replacing work not conforming to requirements of the Contract Documents.
 - 5. General Contractor shall be responsible for cutting and patching of construction as required to facilitate work, including work by his mechanical and electrical subcontractors. He shall assign proper trades normally associated with the materials being cut and patched to perform work.

1.02 RELATED SECTIONS

- A. Section 01010 - Summary of Work.
- B. Section 01300 - Submittals.
- C. Section 01620 - Product Delivery, Storage and Handling.
- D. Individual Product Specification Sections:
 - 1. Cutting and patching incidental to work of the section.
 - 2. Advance notification to other sections of openings required in work of those sections.

1.03 SUBMITTALS

- A. Submit written request in advance of cutting or alteration which 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.

B. Include in request:

1. Identification of Project.
2. Location and description of affected Work.
3. Necessity for cutting or alteration.
4. Description of proposed Work and Products to be us.
5. Alternatives to cutting and patching.
6. Effect on work of Owner or separate contractor.
7. Written permission of affected separate contractor.
8. Date and time work will be executed.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Primary Products: Those required for original installation.
- B. Product Substitution: For any proposed change in materials, submit request for substitution.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.
- B. After uncovering existing Work, assess conditions affecting performance of work.
- C. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.
- B. Provide protection from elements for areas which may be exposed by uncovering work.
- C. Maintain excavations free of water.

3.03 CUTTING

- A. Execute cutting and fitting including excavation and fill to complete the Work.
- B. Uncover work to install improperly sequenced work.
- C. Remove and replace defective or non-conforming work.
- D. Provide openings in the Work for penetration of mechanical and electrical work.
- E. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

3.04 PATCHING

- A. Execute patching to complement adjacent Work.
- B. Fit Products together to integrate with other Work.
- C. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.
- D. Employ original installer to perform patching for weather exposed and moisture resistant elements, and sight-exposed surfaces.
- E. Restore work with new products in accordance with requirements of Contract Documents.
- F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- G. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire resistant material to full thickness of the penetrated element.
- H. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit. When possible, do not cut-and-patch work which is exposed in occupied spaces of building, in a manner resulting in reductions of visual qualities or resulting substantial evidence of cut-and-patch work, both as judged solely by Architect. Remove and replace work judged by Architect to be cut-and-patched in a visually unsatisfactory or otherwise objectionable manner.

END OF SECTION

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.

- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Deductive Alternate No. 1: Deduct Lab 119 and Lab 122 and associated spaces in their entirety. Deduct all Mechanical and Electrical systems serving those spaces. Provide an expandable end wall at the southern face of Lab 117, which shall be the new deducted finished end wall of the south wing. Refer to drawings for further information.
- B. Deductive Alternate No. 2: Provide deduct to replace light fixtures N1 in corridor 124 & 111 with light fixtures H1.
- C. Deductive Alternate No. 3: Deduct clerestory walls, structure, roof, and windows from PEMB over classroom area corridor. Finish the roof and structure as typical with continuous ridge.
- D. Deductive Alternate No. 4:
Deduct Parking Lot & Driveways South of Line shown in Civil sheets. Grading & Storm Drainage to Remain as shown.

END OF SECTION 01230

SECTION 01252

WEATHER DELAYS

PART 1 GENERAL

1.01 EXTENSIONS OF CONTRACT TIME

- A. If the basis exists for an extension of time, an extension of time on the basis of weather may be granted only for the number of Weather Delay Days in excess of the number of days listed as the Standard Baseline for that month.

1.02 STANDARD BASELINE FOR AVERAGE CLIMATIC RANGE

- A. The Owner has reviewed weather data available from the National Oceanic and Atmospheric Administration and determined a Standard Baseline of average climatic range for the project area.
- B. Standard Baseline shall be regarded as the normal and anticipatable number of calendar days for each month during which construction activity shall be expected to be prevented and suspended by cause of adverse weather. Suspension of construction activity for the number of days each month as listed in the Standard Baseline is included in the Work and is not eligible for extension of Contract Time.
- C. Standard Baseline is as follows:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
15	15	13	11	12	11	12	10	8	8	13	15

1.03 ADVERSE WEATHER AND WEATHER DELAY DAYS

- A. Adverse Weather is defined as the occurrence of one or more of the following conditions which prevents exterior construction activity or access to the site within twenty-four (24) hours:
 - 1. precipitation (rain, snow, or ice) in excess of one-tenth inch (0.10") liquid measure
 - 2. temperatures which do not rise above 32 degrees F by 10:00 a.m.
 - 3. standing snow in excess of one inch (1.00")

- B. Adverse Weather may include, if appropriate, "dry-out" or "mud" days:
 - 1. for rain days above the standard baseline;
 - 2. only if there is a hindrance to site access or sitework, such as excavation, backfill, and footings; and,
 - 3. at a rate no greater than 1 make-up day for each day or consecutive days of rain beyond the standard baseline that total 1.0 inch or more, liquid measure, unless specifically recommended otherwise by the Designer.
- C. A Weather Delay Day may be counted if adverse weather prevents work on the project for fifty percent (50%) or more of the contractor's scheduled work day, including a weekend day or holiday if Contractor has scheduled construction activity that day.

1.04 DOCUMENTATION AND SUBMITTALS

A. WEATHER DELAY REPORT:

Use a copy of the following Weather Delay Report, indicating for each calendar month the days on which construction activity affecting the critical path of the Work was prevented by weather conditions. Mark the column for the general cause; and, under "Specifics", indicate corresponding measurement of precipitation, temperature, wind, or other influencing factors, and the construction activity that was scheduled and delayed. At the end of the month, add up the number of days delay, subtract the baseline number given in Paragraph 1.02 (C.), and show the resulting claimable days. Submit a copy of the completed report with the next application for payment and with subsequent claim for time extension. Claims for time extension based upon weather delays will be denied if a submitted report does not corroborate the claim or if no report was submitted when it was required in accordance with this paragraph.

- B. Submit daily jobsite work logs showing which and to what extent construction activities have been affected by weather on a monthly basis.
- C. Submit actual weather data to support claim for time extension obtained from nearest NOAA weather station or other independently verified source approved by Designer at beginning of project.
- D. Use Standard Baseline data provided in this Section when documenting actual delays due to weather in excess of the average climatic range.

- E. Organize claim and documentation to facilitate evaluation on a basis of calendar month periods, and submit in accordance with the procedures for Claims established in the General Conditions.

END OF SECTION

SECTION 01300 - SUBMITTALS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Submittal procedures.
- B. Shop Drawings.
- C. Test reports.
- D. Certificates.
- E. Erection drawings.

1.02 REFERENCES

- A. AGC (Associated General Contractors of America) publication "The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry".

1.03 SUBMITTAL PROCEDURES FOR SHOP DRAWINGS

- A. All shop drawings must be reviewed by the General Contractor before submitting them to the Architect.
- B. Transmit each submittal with accepted form, containing the following:
 - 1. Date
 - 2. Project title
 - 3. Contractor's name and address
 - 4. Notification of any deviations from the contract documents.
 - 5. Identify project as "The Seed Academy Lake Cumberland Regional AgriTech Center"
 - 6. Other pertinent data as required.
- C. Identify Project, Contractor, Subcontractor, Manufacturer or supplier; pertinent drawing and detail number, and specification section number, as appropriate.
 - 1. Provide identification of product or material size, type, finish and color as appropriate.
 - 2. Field dimensions, clearly identified as such.
 - 3. All working and erection dimensions, views, as required to indicate fully all construction and fabrication methods, profiles and materials.
- D. On all shop drawings apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

1.04 CERTIFICATES

- A. When specified in individual specifications sections, submit certification by the manufacturer, installation/application/subcontractor, or the Contractor to Architect/Engineer, in quantities specified for Product Data.
- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect/Engineer.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01310 - CONSTRUCTION PROGRESS SCHEDULES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Format.
- B. Content.
- C. Revisions to schedules.
- D. Submittals.

1.02 RELATED SECTIONS

- A. Section 01011 - Summary of Work.
- B. Section 01027 - Applications for Payment: Application for payment.
- C. Section 01300 - Submittals: Shop drawings.

1.03 REFERENCES

- A. AGC (Associated General Contractors of America) publication "The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry".

1.04 FORMAT

- A. Prepare schedules starting with Notice to Proceed date through substantial completion, as a horizontal bar chart or Gantt chart with separate bar for each major portion of Work or operation, identifying first work day of each week.
- B. Sequence of Listings: The chronological order of the start of each item of Work.
- C. Scale and Spacing: To provide space for notations and revisions.
- D. Sheet Size: Maximum 30" x 42" OR multiples of 8½" x 11".

1.05 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify each item by specification section number.
- C. Identify work of separate stages and other logically grouped activities.
- D. Provide sub-schedules for each stage of Work.
- E. Provide sub-schedules to define critical portions of the entire schedule.
- F. Include conferences and progress meetings in schedule.
- G. Show accumulated percentage of completion of each item, and total percentage of Work completed, to coincide with schedule of values in each application for payment.

- H. Provide separate schedule of submittal dates for shop drawings, product data, and samples, including Owner furnished products and dates reviewed submittals will be required from Architect/Engineer. Indicate decision dates for selection of finishes.
- I. Include scheduling for fabrication of structural steel.
- J. Include scheduling of erection sequence of building structural steel, precast walls and delivery to site.
- K. Include scheduling of erection sequence of building precast walls and delivery to site.

1.06 REVISIONS TO SCHEDULES

- A. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
- B. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
- C. Provide narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect including the effect of changes on schedules of separate contractors.

1.07 SUBMITTALS

- A. Submit initial schedules within 15 days after date of Owner-Contractor Agreement. After review, resubmit required revised data within seven days.
- B. Submit revised Progress Schedules with each Application for Payment.
- C. Submit the number of opaque reproductions which Contractor requires, plus two copies which will be retained by Architect/Engineer.

1.08 DISTRIBUTION

- A. Distribute copies of reviewed schedules to Project site file, Subcontractors, suppliers, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01400 - QUALITY CONTROL

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Quality assurance - control of installation.
- B. Tolerances
- C. Mock-up.
- D. Manufacturers' field services.

1.02 RELATED SECTIONS

- A. Section 01300 - Submittals: Submission of manufacturers' instructions and certificates.
- B. Section 01410 - Testing Services.
- C. Section 01620 - Product Delivery, Storage and Handling.
- D. Section 01650 - Starting of Systems

1.03 QUALITY ASSURANCE - 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/Engineer 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. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.
- G. Perform Work by persons qualified to product required and specified quality.

1.04 TOLERANCES

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

1.05 MOCK-UP

- A. Tests will be performed under provisions identified in this section and identified in the respective Product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be a comparison standard for the remaining Work.
- D. Where mock-up has been accepted by Architect/Engineer and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so.

1.06 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 of equipment and additional products as specified, 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.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Examine and verify specific conditions described in individual specification sections.
- C. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.02 PREPARATION

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

END OF SECTION

SECTION 01410 - TESTING SERVICES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Selection and payment.
- B. Agency responsibilities.
- C. Agency reports.
- D. Limits on testing authority.
- E. Contractor responsibilities.
- F. Schedule of tests.

1.02 RELATED SECTIONS

- A. Section 01300 - Submittals: Manufacturer's certificates.
- B. Section 01400 - Quality Control.
- C. Section 01650 - Starting of Systems: Testing, Adjusting, and Balancing of systems.

1.03 REFERENCES

- A. ASTM C802 - Practice for Conducting an Interlaboratory Test Program to Determine the Precision of Test Methods for Construction.
- B. ASTM C1021 - Practice for Laboratories Engaged in the Testing of Building Sealants.
- C. ASTM C1077 - Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
- D. ASTM C1093 - Practice for Accreditation of Testing Agencies for Unit Masonry.
- E. ASTM D290 - Recommended Practice for Bituminous Mixing Plant Inspection.
- F. ASTM D3740 - Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- G. ASTM D4561 - Practice for Quality Control Systems for an Inspection and Testing Agency for Bituminous Paving Materials.
- H. ASTM E329 - Practice for Use in the Evaluation of Inspection and Testing Agencies as Used in Construction.
- I. ASTM E543 - Practice for Determining the Qualification of Nondestructive Testing Agencies.

- J. ASTM E548 - Practice for Preparation of Criteria for Use in the Evaluation of Testing Laboratories and Inspection Bodies.
- K. ASTM E699 - Practice for Criteria for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating Building Components in Accordance with Test Methods Promulgated by ASTM Committee E6.

1.04 SELECTION AND PAYMENT

- A. Architect will designate a firm or firms to provide construction testing/inspection services for the following listed types of work. Contractor will pay for services of testing/inspection agency or laboratory to perform specified testing from the allowance for testing.
 - 1. Concrete footings, foundations, rebar placement
 - 2. Soil Subgrades
 - 3. Concrete slabs
 - 4. Paving
- B. Observe tests and adjustments for mechanical, electrical, plumbing, piping, welding, conducted by the various trades subcontractors and provide independent verification of results to Architect, Contractor and Owner. Payment for such services shall be made from the Contractor's bid, not the testing allowance.
- C. Employment of testing\inspection agency or laboratory in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
 - 1. Upon initial test results, if defects in the construction are found, further testing of these systems shall be the responsibility of the Contractor in order to ensure these items being tested are in compliance with the specifications.
 - 2. Testing required by defective materials or defective work shall be paid for by the Contractor and is not paid from the allowance.
 - 3. When initial tests requested by the Architect indicate non-compliance with the Contract Documents, costs of initial tests associated with that noncompliance will be deducted by the Owner from the Contract Sum, and subsequent retesting occasioned by the non-compliance shall be performed by the same testing laboratory and the costs thereof shall be paid by the Contractor.
 - 4. The test cost for and adjustments conducted for mechanical, electrical, plumbing and piping systems, including welding and bolt-tightening shall be included in the bid for the associated work.

1.05 AGENCY RESPONSIBILITIES

- A. Test samples of mixes submitted.
- B. Provide qualified personnel at site with prior approval of Architect. Cooperate with Architect/Engineer and Contractor in performance of services.
- C. Perform specified sampling and testing of Products in accordance with specified standards.
- D. Ascertain compliance of materials and mixes with requirements of Contract Documents.
- E. Promptly notify Architect/Engineer and Contractor of observed irregularities or non-conformance of Work or Products.
- F. Perform additional tests as required by Architect/Engineer and approved by the Owner.
- G. Attend progress meetings.

1.06 AGENCY REPORTS

- A. After each test, promptly submit one copy of report to Architect/Engineer and Owner.
- B. Include:
 - 1. Date issued.
 - 2. Project title and number.
 - 3. Name of inspector.
 - 4. Date and time of sampling or inspection.
 - 5. Identification of product and specifications section.
 - 6. Location in the Project.
 - 7. Type of inspection or test.
 - 8. Date of test.
 - 9. Results of tests.
 - 10. Conformance with Contract Documents.
- C. When requested by Architect/Engineer, and approved by Owner, provide interpretation of test results.

1.07 LIMITS ON TESTING AUTHORITY

- A. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
- B. Agency or laboratory may not approve or accept any portion of the Work.
- C. Agency or laboratory may not assume any duties of Contractor.
- D. Agency or laboratory has no authority to stop the Work.

1.08 CONTRACTOR RESPONSIBILITIES

- A. Cooperate with testing/inspection personnel, and provide access to the Work.
- B. Notify Architect/Engineer and testing agency 48 hours prior to expected time for operations requiring testing and inspection services.

1.09 SCHEDULE OF TESTS

- A. Individual Specification Sections: Tests required and standards for testing.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS REQUIREMENTS OF CONTRACTOR

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Temporary Controls: Barriers, enclosures and fencing, protection of the Work, and water control.
- B. Construction Facilities: Access roads, parking and progress cleaning.

1.02 RELATED SECTIONS

- A. Section 01510 - Temporary Utilities.
- B. Section 01540 - Security.
- C. Section 01550 - Access Roads and Parking Areas.
- D. Section 01580 - Project Identification and Signs.
- E. Section 01590 - Field Offices and Sheds.
- F. Section 01700 - Project Closeout: Final cleaning.

1.03 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.
- B. Provide protection for plants designated to remain. Replace damaged plants.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.04 WATER CONTROL

- A. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

1.05 PROTECTION OF INSTALLED WORK

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

- E. 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.
- F. Prohibit traffic from landscaped areas.

1.06 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and rubbish from site periodically and dispose off-site.
- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01510 - TEMPORARY UTILITIES REQUIREMENTS OF CONTRACTOR

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Temporary Utilities: Electricity, lighting, heat, ventilation, telephone service, water, and sanitary facilities.

1.02 RELATED SECTIONS

- A. Section 01580 - Project Identification and Signs.
- B. Section 01590 - Field Offices and Sheds.
- C. Section 01700 - Contract Closeout: Final cleaning.

1.03 TEMPORARY ELECTRICITY

- A. Cost: By Contractor; provide and pay for power service required from utility source or on-site generators.
- B. Provide temporary electric feeder from electrical service at approved point of available service. Do not disrupt Owner's need for continuous service.
- C. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.
- D. Provide main service disconnect and over-current protection at convenient location.
- E. Permanent convenience receptacles may be utilized during construction.

1.04 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain lighting for construction operations.
- B. Permanent building lighting may be utilized during construction upon written approval from Owner.

1.05 TEMPORARY HEATING AND AIR CONDITIONING

- A. Provide and pay for heating and air conditioning devices and heat and air condition as needed to maintain specified conditions for construction operations.
- B. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications and provided by manufacturer instructions.

1.06 TEMPORARY COOLING

- A. Provide and pay for cooling devices and cooling as needed to maintain specified conditions for construction operations.

1.07 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Utilize existing ventilation equipment. Extend and supplement equipment with temporary fan units as required to maintain clean air for construction operations.

1.08 TELEPHONE SERVICE

- A. Provide, maintain, and pay for telephone service to field office at time of project mobilization.

1.09 FACSIMILE SERVICE

- A. Provide, maintain and pay for facsimile service to field office at time of project mobilization.

1.10 TEMPORARY WATER SERVICE

- A. Provide, maintain and pay for suitable quality water service required for construction operations at time of project mobilization.
- B. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

1.11 TEMPORARY SANITARY FACILITIES

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

1.12 WARRANTY PERIOD

- A. The warranty period for all permanent equipment used for temporary purposes by the Contractor including lighting, heating and cooling equipment shall commence from date of final completion of the entire project.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01580 - PROJECT IDENTIFICATION AND SIGNS REQUIREMENTS OF CONTRACTOR

PART 1 - GENERAL

There will be one (1) sign for this project.

1.01 SECTION INCLUDES

- A. Project identification sign.

1.02 RELATED SECTIONS

- A. Section 01010 - Summary of Work.

1.03 QUALITY ASSURANCE

- A. Design sign and structure to withstand 60 miles/hr wind velocity.
- B. Sign Painter: Experienced as a professional sign painter for minimum three years.
- C. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

1.04 SUBMITTALS

- A. Section 01300 - Submittals: Shop drawings.
- B. Show content, layout, lettering, color, foundation, structure, sizes, and grades of members.

PART 2 - PRODUCTS

2.01 SIGN MATERIALS

- A. Structure and Framing: New wood, structurally adequate.
- B. Sign surfaces: Exterior grade plywood with medium density overlay, minimum 3/4 inch thick, standard large sizes to minimize joints.
- C. Rough Hardware: Galvanized.
- D. Paint and Primers: Exterior quality, two coats; sign background of color as selected.
- E. Lettering: Exterior quality paint, contrasting colors as selected.

2.02 PROJECT IDENTIFICATION SIGN

- A. One painted sign of construction, design, and content shown on Drawings, location designated.

- B. Content:
 - 1. Project title, logo and name of Owner as indicated on Contract Documents.
 - 2. Names and titles of authorities.
 - 3. Names and titles of Architect/Engineer and Consultants.
 - 4. Name of Prime Contractor and major Subcontractors.
- C. Graphic Design, Colors, Style of Lettering: Designated by Architect/Engineer and approved by Owner.

2.03 PROJECT INFORMATIONAL SIGNS

- A. Painted informational signs of same colors and lettering as Project Identification sign, or standard products; size lettering to provide legibility at 100-foot distance.
- B. Provide at each field office, and directional signs to direct traffic into and within site. Relocate as Work progress requires.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install project identification sign within 30 days after date fixed by Owner-Contractor Agreement.
- B. Erect at designated location.
- C. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.
- D. Install sign surface plumb and level, with butt joints. Anchor securely.
- E. Paint exposed surfaces of sign, supports, and framing.

3.02 MAINTENANCE

- A. Maintain signs and supports clean, repair deterioration and damage.

3.03 REMOVAL

- A. Remove signs, framing, supports, and foundations at completion of Project and restore the area.

END OF SECTION

SECTION 01590 - FIELD OFFICES AND SHEDS REQUIREMENTS OF CONTRACTOR

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Temporary field offices and sheds.
- B. Maintenance and cleaning.
- C. Removal.

1.02 RELATED SECTIONS

- A. Section 01010 - Summary of Work.
- B. Section 01550 - Access Roads and Parking Areas.
- C. Section 01580 - Project Identification and Signs.
- D. Section 01620- Product Delivery, Storage and Protection.

1.03 USE OF PERMANENT FACILITIES

- A. Permanent facilities shall not be used for field offices or for storage.

PART 2 - PRODUCTS

2.01 MATERIALS, EQUIPMENT, FURNISHINGS

- A. Materials, Equipment, Furnishings: Serviceable, new or used, adequate for required purpose.

2.02 CONSTRUCTION

- A. Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.
- B. Construction: Structurally sound, secure, weather tight enclosures for office and storage spaces. Maintain during progress of Work; remove at completion of Work.
- C. Temperature Transmission Resistance of Floors, Walls, and Ceilings: Compatible with occupancy and storage requirements.
- D. Exterior Materials: Weather resistant, finished.

- E. Interior Materials in Offices: Sheet type materials for walls and ceilings, pre-finished or painted; resilient floors and bases.
- F. Lighting for Offices: 50 footcandles at desk top height, exterior lighting a. entrance doors.
- G. Fire Extinguishers: Appropriate type fire extinguisher at each office and each storage area.
- H. Interior Materials in Storage Sheds: As required to provide specified conditions for storage of products.

2.03 ENVIRONMENTAL CONTROL

- A. Heating, Cooling, and Ventilating for Offices: Automatic equipment to maintain 68 degrees F heating and 76 degrees F cooling.
- B. Storage Spaces: Heating and ventilation as needed to maintain Products in accordance with Contract Documents; adequate lighting for maintenance and inspection of Products.

2.04 CONTRACTOR OFFICE AND FACILITIES

- A. Size: For Contractor's needs and to provide space for project meetings.
- B. Telephone: As specified in Section 01510.
- C. Fax: As specified in Section 01510.
- D. Furnishings in Meeting Area: Conference table and chairs to seat at least eight persons; racks and files for Contract Documents, submittals, and project record documents.
- E. Other Furnishings: Contractor's option.

2.05 STORAGE AREAS AND SHEDS

- A. Size to storage requirements for products of individual Sections, allowing for access and orderly provision for maintenance and for inspection of products to requirements of Section 01620.

PART 3 - EXECUTION

3.01 MAINTENANCE AND CLEANING

- A. Maintain approach walks free of mud, water, and snow.
- C. Sanitary service as needed to maintain clean, odor-free environment.

3.02 REMOVAL

- A. At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

END OF SECTION

SECTION 01620 - PRODUCT DELIVERY, STORAGE & PROTECTION

PART 1 - GENERAL

1.01 APPLICABILITY

- A. This Section applies to all products furnished under this Agreement. Shipments of equipment or materials to be used by the Contractor or its subcontractors shall be delivered to the site only during regular working hours. All shipping papers and shipments shall be addressed and consigned to the Contractor giving the name of the Project with address. Under no circumstances will Owner accept shipments directed to it or the Architect/Engineer unless otherwise specified.

1.02 DELIVERY

- A. Products shall not be delivered to the Owner or the Architect/Engineer.
- B Products shall not be delivered to the project site until related shop drawings have been reviewed by the Architect/Engineer.
- C. Products shall not be delivered to the project site until appropriate storage facilities are in place (on-site storage space is very limited).
- D. Products shall be delivered to the site in manufacturer's original, unopened, labeled containers.
- E. The Contractor shall not drop, roll or skid products off delivery vehicles. Hand carry or use suitable materials-handling equipment.

1.03 STORAGE AND PROTECTION

- A. General:
 - 1. The Contractor shall store and protect products in accordance with the manufacturer's recommendations and the requirements specified herein. No on-site existing storage facilities are available for use by the Contractor. All on-site facilities for storage shall be furnished by the Contractor.
 - 2. The Contractor shall not block or restrict the use of public right-of way, access roads or private property with stored materials.
 - 3. The Contractor shall not store products where they will interfere with operations of the Owner.
 - 4. The Contractor shall protect all products from damage or deterioration by weather.

- 5 . The Contractor shall not store any products directly on the ground.
6. The Contractor shall not store any products in drainage ditches or areas where water may stand.
7. The Contractor shall label containers to identify materials inside using the terminology found in these Specifications.

B. Uncovered Storage:

1. The following types of materials may be stored out of doors without cover:
 - a. Masonry units
 - b. Reinforcing steel
 - c. Piping
 - d. Precast concrete items
 - e. Castings
2. The above mentioned materials shall be stored on wood blocking.

C. Fully Protected Storage:

1. The Contractor shall store all products not named above in buildings or trailers which have a concrete or wooden floor, a roof; and fully enclosed walls on all sides.
2. The Contractor shall provide heated storage space for materials which would be damaged by freezing.
3. The Contractor shall protect mechanical and electrical equipment from being contaminated by dust and dirt.
4. The Contractor shall maintain temperature and humidity at levels recommended by manufacturer(s) for electrical and electronic equipment.

END OF SECTION

SECTION 01650 - STARTING OF SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Starting systems.
- B. Demonstration and instructions.
- C. Testing, adjusting, and balancing.

1.02 RELATED SECTIONS

- A. Section 01400 - Quality Control: Manufacturers field reports.
- B. Section 01700 - Contract Closeout: System operation and maintenance data and extra materials.

1.03 STARTING SYSTEMS

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

1.04 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of Products to Owner's personnel prior to date of Substantial Completion.
- B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
 - 1. Warranty period to begin at start-up of season.
- C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.
- D. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time at designated location.
- E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- F. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01700 - PROJECT CLOSEOUT REQUIREMENTS OF CONTRACTOR

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Closeout procedures.
- B. Final cleaning.
- C. Adjusting.
- D. Project record documents.
- E. Operation and maintenance data.
- F. Spare parts and maintenance products.
- G. Warranties and bonds.

1.02 RELATED SECTIONS

- A. Section 01650 - Starting of Systems: System start-up, testing, adjusting, and balancing.

1.03 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect/Engineer's review.
- B. Provide submittals to Architect/Engineer that are required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- D. Deliver all close-out documents to the Architect within forty-five (45) days of the date of Substantial Completion. Indemnify the Architect for failure to perform this requirement including legal fees incurred by the Architect in enforcing this requirement. Failure to deliver all required close-out documents to the Architect within forty-five (45) days from sign-off of AIA Document G704, "Certificate of Substantial Completion," shall invoke costs of the Architect's services to be borne by the Contractor.
- E. Submit Certificate of Substantial Completion: AIA Document G704, 1992 Edition.
- F. Submit Contractor's Affidavit of Payment of Debts and Claims: AIA Document G706, 1994 Edition.

- G. Submit Contractor's Affidavit of Release of Liens: AIA Document G706A, 1994 Edition.
- H. Submit certification prior to submission of final application for payment attesting that certain products meet Factory Mutual (FM) approval.

1.04 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment. Use experienced workmen or professional cleaners for final cleaning.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- D. Replace filters of operating equipment.
- E. Clean debris from roofs, gutters, downspouts, and drainage systems.
- F. Clean site; sweep paved areas, rake clean landscaped surfaces.
- G. Remove waste and surplus materials, rubbish, and construction facilities from the site weekly (or more often as required by accumulation). Remove waste materials, rubbish and debris from the site and legally dispose of at public or private dumping areas off-site at least once a week. Site to be approved by Owner.
- H. Each subcontractor has the responsibility for protecting equipment and finishes at the job site from damages resulting from work under his control, for all cleaning required as a result of his failure to protect equipment and finishes, and for removal of protective covers.
- I. Safety Standards: Maintain project in accordance with the OSHA safety standards, as stipulated under the Occupational Safety and Health Act of 1970 and printed May 29, 1971 in the Federal Register.
- J. Fire Protection: Store volatile waste in covered metal containers and remove from premises daily.
- K. Pollution Control: Conduct cleanup and disposal operations to comply with local ordinances and anti-pollution laws.
 - 1. Disposal of volatile fluid wastes (such as mineral spirits, oil, or paint thinner) in storm or sanitary sewer systems or into streams or waterways is not permitted.
- L. Vacuum clean interior building areas when ready to receive finish painting and continue vacuum cleaning on an as-needed basis until building is ready for acceptance or occupancy.
- M. Repair, patch and touch-up marred surfaces to match adjacent finishes. Coordinate with requirements specified under the various sections of these specifications.

- N. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly-painted surfaces.

1.05 ADJUSTING

- A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.06 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents in clean, dry, legible condition; record actual revisions to the Work:
 - 1. Drawings
 - 2. Specifications
 - 3. Addenda
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed Shop Drawings, Product Data, and Samples.
 - 6. Manufacturer's instruction for assembly, installation, adjusting, maintenance and operation.
- 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. Label each document "Project Record."
- E. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by Addenda and modifications.
- F. Record Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured depths of foundations in relation to finish first floor datum.
 - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 4. Field changes of dimension and detail.
 - 5. Details not on original Contract drawings.
 - 6. Review applied changes to C.A.D. drawings.
- G. Submit documents to Architect/Engineer prior to claim for final Application for Payment.
 - 1. The Contractor shall submit to the Architect one set of "Record" drawings which accurately reflect the actual installation of any and all materials, piping, conduit, etc., which were not installed exactly in accordance with the contract drawings.
 - 2. Contractor shall submit to the Architect two (2) (corrected) final record copies of shop drawings marked "for job use" which reflect all changes required in previous submittals including these marked "Approved as Noted," or similarly revised by the Engineer.

1.07 OPERATION AND MAINTENANCE DATA

- A. Submit data bound in 8½ x 11 inch (A4) text pages, three D side ring binders with durable plastic covers.
- B. Prepare binder cover with printed title “OPERATION AND MAINTENANCE INSTRUCTIONS.”
- C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, typed on white paper, in three parts as follows:
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 - 3. Part 3: Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - b. Air and water balance reports.
 - c. Certificates.
 - d. Originals of warranties.
- E. Submit 1 draft copy of completed volumes 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect/Engineer comments. Revise content of all document sets as required prior to final submission.
- F. Submit three (3) sets of revised final volumes to Architect/Engineer within thirty (30) days of Architect/Engineer review.

1.08 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Provide spare parts, maintenance, and extra Products in quantities specified in individual specification sections.
- B. Deliver to Project site and place in location as directed by Owner; obtain receipt prior to final payment.

1.09 WARRANTIES AND BONDS

- A. Provide notarized copies.
- B. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers.
- C. Provide Table of Contents and assemble in three D side ring binder with durable plastic cover.
- D. Submit one (1) original and two (2) copies prior to final Application for Payment. All such documents shall indicate the name and location of the project and the name of the purchaser.
- E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 02010 - SOILS INVESTIGATION

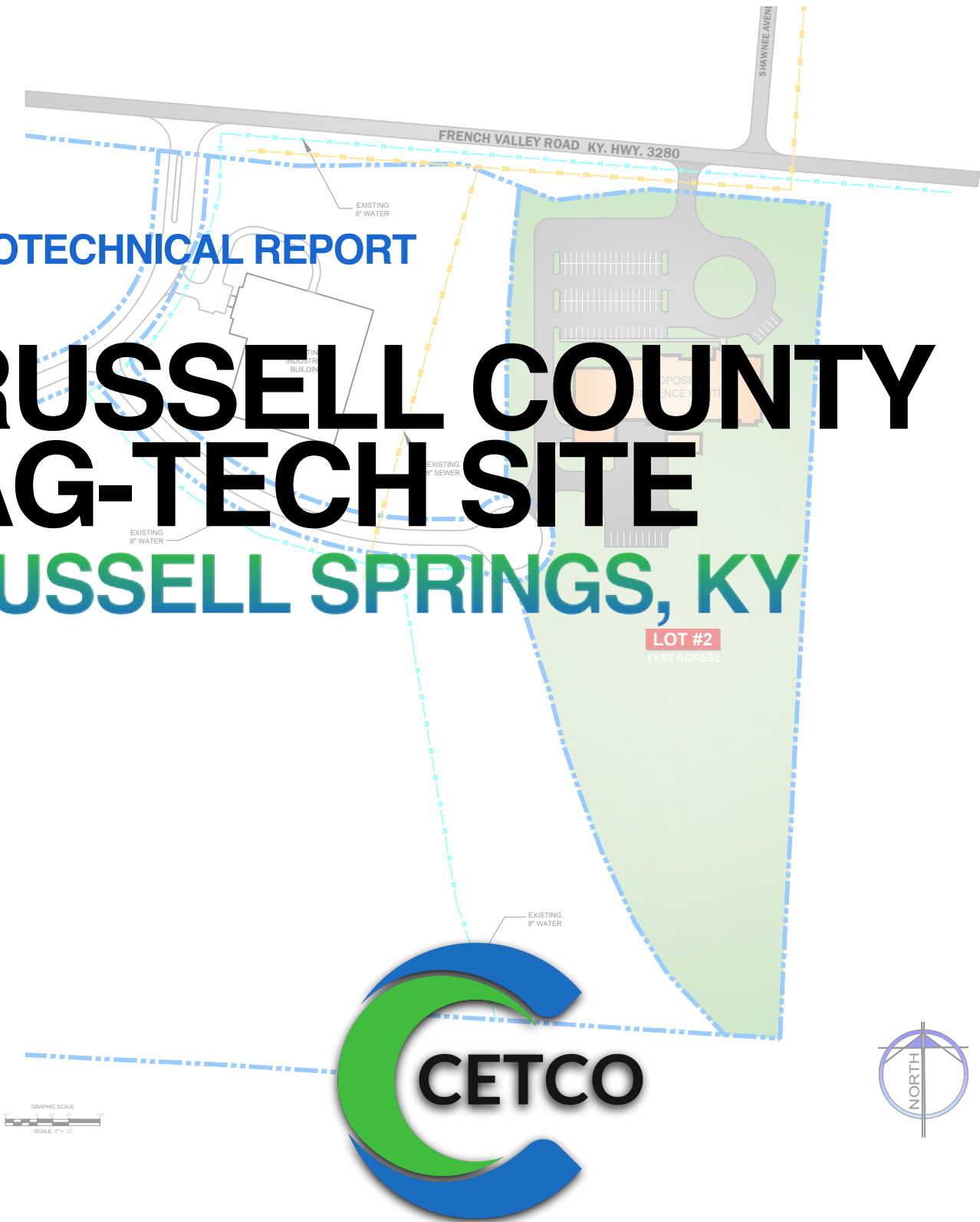
The recommendations of Geotechnical Report for the Russell County Ag-Tech Site, Russell Springs, KY by CETCO and dated May 11, 2022, is incorporated into the requirements of the contract documents and shall be followed in its entirety.

END OF SECTION

May 11, 2022

GEOTECHNICAL REPORT

RUSSELL COUNTY
AG-TECH SITE
RUSSELL SPRINGS, KY





May 11, 2022

Russell County Industrial Authority
Sent % Mr. Glen Ross, PE
MSE of Kentucky
via email: glenross@mselex.com

Subject: **Geotechnical Report**
Russell Co. Ag-Tech Site
Russell Springs, Kentucky
CETCO Project No. 1776-22-0103


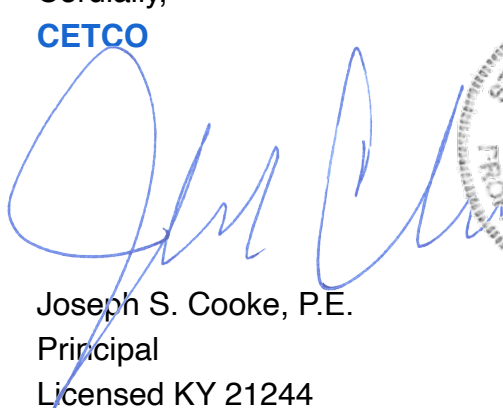
Dear Mr. Ross:

CETCO appreciates the opportunity to provide our services to you and your project. As follows, we are providing our geotechnical report. Also, please note the report Appendix which contains many detailed findings as well as our standard of care for providing our services.

We appreciate the opportunity to provide our geotechnical services to you and the project team. Please do not hesitate to contact us for questions or comments about the information contained herein.

Cordially,

CETCO



Joseph S. Cooke, P.E.
Principal
Licensed KY 21244

Attachments: Geotechnical Report and Appendix



*Cooke Engineering and
Testing Company*

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Russell County Ag-Tech Site

RUSSELL SPRINGS, KENTUCKY

GEOTECHNICAL REPORT SUMMARY

We provided our services in general accordance with our previous discussions and our proposal number 1776–0137, dated April 3, 2022 and approved by the Russell County Industrial Authority on April 14, 2022. CETCO has consulted with Mr. Glen Ross, PE, of MSE and discussed the need for CETCO to provide geotechnical services including sampling and exploration with soil test borings, a site field services by our office, lab testing and analysis, review of project drawings and providing a geotechnical report. These services included providing our opinion of the conditions encountered for the purpose of design and construction of a new “Agri-Business Training Center” (which we are referring to as the Russell Co. Ag-Tech project. The project plans are in the preliminary stage, so the final location on the site, exact size and exact building type are not known at this time. However, the overall site is located just east of the existing “spec building” at the Lake Cumberland Regional Industrial Complex on the southwest side of Russell Springs, Kentucky. Provided plans indicate that the main building will be about 35,000 square feet in size and will be located on the northern section of “Lot #2”. This introductory section, which has previously been discussed with your office, provides a brief summary for quick reference. The report that follows provides much greater details for design and construction purposes.

In general, we encountered the typical “reddish cherty clay and sandy soil” found in most of Russell Springs. Soils also contained significant silt. Some gray and brown clay/sandy soils were also observed. We did not encounter hard bedrock in any of our borings (which extended to a maximum of 25 feet deep). However, some limestone/sandstone floater boulders were observed at various elevations in our borings as well as the potential top of soft sandstone bedrock at or near 18 feet deep in some locations. As with most of Russell Springs, we encountered wet conditions in our borings; typically beginning at about 8 to 13 feet deep and deeper. Most of the soil was firm or stiffer, but some soft areas were observed.

The site is suitable for the proposed ag-tech facility and associated site improvements. We believe shallow spread footings and conventional slab-on-grade floors would be suitable for most new building types. Also, conventional pavement types and thickness are suitable. The primary concerns appear to be construction-related: some soft soil pockets/layers, sandy zones, silty soils and wet zones. We do not believe large amounts of abnormal construction

practices will be needed, but some modifications are recommended and should be budgeted. Details for these issues and recommendations for design and construction as well as our other recommendations are discussed in the report.

1 PROJECT BACKGROUND

1.1 CETCO SCOPE OF SERVICES

Our scope of services included review of provided drawings, exploration of the proposed site with soil test borings at select locations and laboratory testing and geotechnical analysis. After we completed our reviews, field work and laboratory testing, we are issuing this geotechnical report as follows.

1.2 PROVIDED INFORMATION

We were provided information for the project as follows:

Provided Document	Source
Site drawings by MSE, showing a potential layout and location of the proposed new building and parking/pavement areas.	MSE.
Site location plan (aerial overlay of project boundaries).	MSE.

The following information summarizes our understanding of the project conditions

Condition	Specifics
Building/Structure Information	<u>No building type has been selected.</u> However, the building will likely be about 35,000 square feet in size and would be one to two stories tall.
Site Grading	The site is relatively flat, but at least 5 to 8 feet of cut and fill will be required to achieve finished sub grade elevations at some locations.
Foundations/Floor Slabs	Shallow spread footings and a slab-on-grade floor are anticipated. Maximum loading of less than 150 kips for columns and 6 kips per linear foot for continuous footings are assumed. Floor slab loads of less than 150 pounds per square feet (psf) are assumed for most of the building. Some areas of 500 psf may be possible in equipment rooms.

If any of the aforementioned information is incorrect or requires modification, please let CETCO know. Changes to our reporting, recommendations and opinions may be required.

1.3 PUBLISHED SITE AND AREA INFORMATION

We have reviewed the following published/public domain site information.

AREA TOPOGRAPHY AND PHYSIOGRAPHY

The site is located in the southeastern section of the “Pennyroyal or Mississippian Plateau” physiographic region of Kentucky. This area consists of a limestone plain characterized by “karst” topography: tens of thousands of sinkholes, sinking streams, streamless valleys, springs, and caverns. Knobby areas of the region are also present as well as some narrow valleys and moderate ridge lines. However, some of the higher elevations in the area can be “karst-free” due to uprising of differing geological bedrock formations.

SITE GEOLOGY

The Kentucky Geologic Survey public information was reviewed including the USGS Russell Springs Geologic Quadrangle. The site is underlain by the Salem and Warsaw Formations as well as a “sandstone” outcrop formation (likely either the Salem and Warsaw or the underlying Fort Payne Formation). The Salem and Warsaw is mapped as limestone and shale bedrock with abundant chert (often in beds) weathering to yellow to brownish red sandy clay soil with porous sandstone lenses. The sandstone outcrop is “weak” sandstone bedrock with thin lenses of chert, clay shale and sandy siltstone. Both of these formations can contain “karst” features such as sinkholes. However, the karst risk is much lower than conventional “red clay over limestone” areas found elsewhere in the area or this region of Kentucky. The site is mapped as “no risk or low to moderate risk” for karst development (sinkholes, caverns, erratic top of rock, springs, etc.). No sinkholes are mapped within 1 mile of the site, but the nearby swales/creek areas likely contain “springs” which are common karst features.

SITE SOIL SURVEY MAPPING

The Soil Survey of the site area was also reviewed. Issues affecting the site development included: shallow water/wet conditions and slope construction. We are providing recommendations to address these issues. Also, the soil survey lists portions of the site as having “high risk” for corrosion of steel. Typically, the main risk for corrosion would be for steel reinforcement in concrete foundations and slabs. The primary means to address this risk is to



specify at least 2 inches of concrete cover over all steel reinforcement for concrete exposed to soil.

RECENT AND CURRENT PUBLISHED AERIAL MAPPING

Aerial information back as far as 1997 were readily available for the site. The conditions observed at the site and on all these aerial maps reviewed appear to be very similar. The site appears to have been a relatively undisturbed agricultural field the entire time. The areas to the west of the site appear to be unchanged since 2010. This includes the industrial park roads and “spec” building.

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2 CETCO FINDINGS

We provided a site and area reconnaissance, logged soil test borings and explored the site using those borings. The following sections discuss our findings. Mr. Joe Cooke, PE, provided our field services during the exploration on April 21, 2022.

2.1 CURRENT SITE SURFACE CONDITIONS AND OBSERVATIONS

The overall site is a relatively level (with some gently rolling slopes/low-lying areas) open agricultural field. Aerial photos from 1997 to the present show mostly “grassy cover”, but the site appears to have some seeded ground cover crop as well as corn stalk remnants from the past year or so, which creates a slightly “cultivated” (disturbed) upper 12 inches of ground cover. The current vegetative ground cover over most of the site was knee-to-waist high grasses. Wooded and brushy vegetative areas bound the site on the east, west and south areas. The overall site is 5 to 10 feet lower in elevation than the main road on the north boundary of the site (French Valley Road), so a sharp, upward slope is present from the site up to the road.

Most of the site surface conditions were relatively firm and easy to traverse. The low-lying areas (**especially on the east-central section of the site**) were soft and wet. The support truck became stuck in this east-central area. **Despite recent rains, the ground surface did not contain ponding water (indicative of mostly good surface drainage)**. However, a few “crawfish” holes were observed on-site, especially in the east-central area. These are indications of shallow wet conditions.

A possible filled sinkhole was observed on the property to the east of the site, but no obvious sinkhole or closed depression were observed on-site.



The following pages show photos at the site at the time of our field work.

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Project Photos

Description	Photo
<p>Showing example view of the site, facing south. Knee-to-waist high grasses over much of the area with tree and brush lined perimeters.</p>	
<p>Showing the low-lying area on east-central area of the site, with support truck “stuck” in soft/wet surface conditions. Facing north.</p>	

Project Site Photos (cont.)

Description	Photo
<p>View of possible “crawfish” holes on east-central area of the site. Also, corn stalk remnants are shown.</p>	
<p>View of “thicker” vegetation ground cover on the north area of the site. Facing northwest.</p>	

Project Site Photos (cont.)-1

Description	Photo
<p>Showing example “gray sandy” zone material, typically found below 10 feet or so below the ground surface.</p>	
<p>View of recovered samples. Wet appearance on the exterior portions of the sample touching the steel, but the actual drier conditions on the inside of the sample. This is an example of “disturbance” creating a wet conditions (dilatancy) of the samples.</p>	

2.2 SUBSURFACE INFORMATION SUMMARY

A total of 2 soil test borings and 8 auger rock-soundings were utilized to explore the subsurface conditions at the site. The two soil test borings and four of the soundings were drilled within the provided plan's building location. The remaining soundings were drilled in pavement areas and nearby open areas of the site.

SUBSURFACE CONDITIONS: At our sampling locations, we encountered topsoil overlying generally orange to reddish sandy clay soils with significant silt content. This upper orange/reddish clayey soil zone was about 2 to 5 feet thick and was very silty and contained fine sand. One sample tested as a "silt" (ML) soil near the bottom of this layer. Below this upper mantle of soil, orange, brown, reddish and grayish silty sand was observed at variable depths in the borings. Coloring was in "zones" and had "thick layers". Some chert lenses (dense gravelly layers) and some sandstone/limestone floaters were encountered at variable depths. The site soils were generally firm to stiff (clays and silts) and firm to very firm (sands), but some soft/loose layers were observed. These soft/loose layers tended to coincide with soils at or just below the chert lenses or more sandy zones. In all the borings, very sandy soils were encountered for the last 8 to 15 feet. Below is a table summarizing the soil conditions at the site. Detailed findings are in the Appendix boring logs and laboratory testing pages.

Strata	Thickness	Notes
Topsoil	8 to 12 inches	
Upper strata of brown, reddish and orange lean clay soil; the layer was very silty and often contained fine sand. Generally firm and very moist	About 2 to 5 feet thick	
Chert (gravelly) lenses and floaters (limestone or sandstone boulders)	Mostly less than 4 feet thick	Observed at variable depths, but most were either 4-6 feet deep or at 16-18 feet deep.
Lower layers were generally silty and clayey, fine to medium grained SAND. Generally reddish or orange in color or gray in color. These layers were very moist to wet and generally firm to very firm in density.	About 10 to 15 feet (or more)	Located in all borings.

Hard bedrock or auger refusal were not encountered in any of our borings. However, the top of "soft" bedrock was possibly encountered in a few of the borings at around 18 to 20 feet deep. All borings were terminated at 20 to 25 feet deep.

GROUNDWATER CONDITIONS: The area is known for relatively shallow wet conditions. At the time of drilling, water was encountered in all of the borings. The depth to wet conditions is shown in the table below.

*One note is that true “water” depth is more likely to be at least 13 or more feet deep. The upper free water conditions found in three borings is likely due to disturbance during drilling creating “dilatancy” water observations. See previous pages photos of example wet soil near the sampler but the actual (real) “drier” soil conditions of intact soil samples are shown as well.

Boring Number	Depth to Wet Conditions (ft.)
B-1	7.5*
B-2	6.5*
S-1	14
S-2	13.5
S-3	13
S-4	13.5
S-5	13
S-6	13
S-7	6.5*
S-8	10

Table showing depth to wet conditions at our boring locations.

*See discussion in the paragraph above

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3 OPINIONS AND DISCUSSION

SUMMARY: In general, the project site is suitable for the proposed new building and pavement site improvements. This includes the use of shallow spread footings (for most building types and loads) and conventional building slab-on-grade floors.

3.1 PRIMARY GEOTECHNICAL ISSUES

The following issues are our opinion of the primary geotechnical-related issues at the site. Other issues are likely present, but we believe the following represent the greatest impact to the project budget, schedule, design and construction. Our recommendations address these issues.

- Silty and sandy soils
- Chert lenses and floaters
- Low-lying areas
- Shallow wet conditions

Silty and Sandy Soils

The site soils contain significant amounts of silt and sand. Silty soils and silty soils with significant amounts of sand tend to destabilize rapidly under construction traffic. **Further, these soils tend to pump and rut when only slightly “wet”. They will “fail” proof roll testing even under acceptable moisture conditions. Undercutting the soils can tend to be futile since most of the site soils are silty no matter the depth and the site soils become more sandy with depth.** Means to stabilize the material can also be very expensive.

However, area construction practice and our experience has shown that once these soils are confined (such as under slabs, pavements and footings) they tend to be stable both short-term and long-term, despite this initial appearance of instability (pumping, rutting and probing “soft”). On a case-by-case basis, the need for stabilization, undercutting or combinations thereof, should therefore be determined by CETCO.

Our recommendations contained in this report address this issue and provide guidance for some of the most common scenarios.

Lastly, the upper mantle of silty soil has been disturbed by farming means and can often be deemed “topsoil” and excess undercutting/stripping is common in similar areas. CETCO should be retained to observe topsoil removal to minimize the risk and cost of excess stripping.

Chert Lenses and Large Floaters

We observed chert lenses (gravelly layers) in our borings. Floaters (limestone or sandstone boulders and cobbles) were also encountered. Both of these types of materials were located at random areas and random depths. The lenses can be small (less than a few feet wide and thick) or larger (many feet wide and several feet thick). The floaters are usually smaller than a few feet across and thinner than 1 to 2 feet.

The chert lenses can have large pockets of water within them or near them. Dewatering may be required around these lenses. The chert lenses material can be re-used as structural fill, but chert pieces or floaters larger than 12 inches should be segregated from the fill materials and placed outside the fill areas or crushed/broken down to smaller pieces.

Low-lying Areas

Several lower elevation areas were observed on-site, especially along the east-central areas. **The topsoil and organic surface materials were thicker in these areas. Surface soils were also softer and wetter.** Additional undercutting and or the use of stabilizing materials (#2 stone, geo-grids, etc.) may be needed in the areas, especially in areas within 10 feet of any building (horizontally) or within the top 5 feet of pavement area sub grades.

Shallow Wet Conditions

Russell Springs is widely known to have areas of relatively shallow wet conditions. However, most projects in the area can be constructed with somewhat normal means without excessive dewatering budgets.

Most of the wet conditions encountered in our borings is located at about 8 to 13 feet deep from the current top of ground elevations. The site is relatively level, so deep cuts are not expected and mass earthwork should mostly encounter smaller zones of wet conditions and not this deeper widespread wet zone.

Also, the “shallow” wet conditions (encountered in 3 borings) are likely due to “disturbance” while drilling. Silty and silty sand soils (common on this site) “release” water when disturbed.

The process is called dilatancy. **The disturbances often triggering the release of water could include vibration, repetitive construction traffic or other similar construction disturbance.** This will destabilize the shallow soils in the areas. No vibratory action should be used on compaction equipment and jumping jack type compactors should be avoided. Main construction entrance areas (areas of very high amounts of repetitive traffic) should consider the use of geogrids (Tensar TX5 or greater) under gravel roads to minimize the need for deep or repetitive stabilization. Again, when the soils become confined (under footings, slabs and pavements) at the end of construction, this destabilizing action greatly reduces.

Deeper soils at the site are mostly very sandy and the water remains “free”, creating “real” and “long-term” wet conditions. Excavations deeper than about 8 feet should expect wet conditions AND very sandy soils. Storm drains/sewer line excavations often reach this depth. The use of trench boxes to minimize large-scale cutting back of excavations is warranted. Excavations at or near structures may create “undermining” conditions due to this water/sandy soil zone.

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4 RECOMMENDATIONS

The following recommendations are provided to assist in the planning, design and construction of the project.

4.1 SITE PREPARATION

We recommend that site grading should take place between about late April to early November. Earthwork taking place outside this time period will likely encounter wet conditions and weather conditions that will provide little to no assistance with drying the soils. Additionally, the following bulleted items are critical to prepare the site for earthwork and additional construction.

- Topsoil and organic materials should be removed (stripped) from the construction area and all structural fill areas. These materials should be wasted from the site or used as topsoil in landscape areas. As stated, the site contains possibly previously cultivated soils and existing “sowed” grassy cover crop materials. These existing and previous conditions can create the **appearance** of topsoil at depths of 18 inches or more, despite not actually being topsoil. **CETCO should be on-site to observe topsoil removal to avoid over-stripping;**
- Areas ready to receive new fill should be proofrolled with a loaded dump truck or similar equipment judged acceptable by CETCO. **The upper mantle of site soils will not likely pass a proof roll, even under perfect conditions. These areas were more “silty” and could break down/destabilize under repeated or heavy traffic. The level of proofroll should be determined by CETCO;**
- Proofrolling should not be performed on wet subgrade. If possible, perform proof rolls after suitable dry weather periods of time;
- Low-lying areas will not pass a proof-roll. **Undercutting of these soils is not prudent,** since wet/soft conditions are likely down to very deep depths. The areas may require “bridging” of some sorts, as directed by CETCO;
- CETCO should determine amounts of undercutting (if any) for any area which pumps or ruts. CETCO should also determine acceptable backfill materials and backfill methods. In general any backfill should be accomplished in general accordance with section 4.2;
- Remove deleterious materials or materials that are unsuitable for use in supporting the overlying new fill. The backfill should be consistent with the requirements listed in section 4.2;

- CETCO should observe the proofrolling operations and make recommendations for any unstable or unsuitable conditions encountered.

4.2 EARTHWORK

Before new fill construction, representative samples should be obtained of the proposed fill material to determine the moisture-density and overall classification of the material. The tests also would assist in determining if the material is suitable for use as structural fill.

After the subgrade has been approved to receive new fill, the fill may commence with the following procedures and guidelines recommended:

Mass Earthwork

- Based on our observations and laboratory testing, the on-site soils appear to be suitable for use as structural fill;
- The soils appear to have highly variable amounts of sand, chert and limestone rock. Also, large floaters may be present in the soil mass. Rock larger than 12 inches will have to be wasted off-site or broken to smaller pieces;
- Rock and soil mixtures could be present in areas of the site. **New fill with rock and soil mixed should be placed and treated like soil fill and is not to be considered a rock fill.** A sheepsfoot roller should be used to compact the fill and the following fill guidelines should be used;
- No vibratory action should be used on rollers;
- Fill placement guidelines:
 - Structural fill should be placed in maximum 8-inch thick loose lifts;
 - Maximum particle size of the soil should be limited to 12 inches in any dimension;
 - Materials should have a plasticity index (PI) of less than 30.
- Quality control testing guidelines:
 - Density testing for on-site materials may not be practical for some portions of the existing materials (chert, sand, gravel and cobbles);
 - Density testing of cleaner clay/silt soils should be performed. The rate of testing should be at least 3 per lift and at least one per 10,000 square feet of soil

placement. Soil should be compacted to at least 95 percent of standard Proctor (ASTM D698) maximum dry density. Moisture content should be from minus 3 to plus 1 percent of optimum moisture content (range is such due to silty nature of the site soils);

- **Do not over compact (or over-roll) the on-site soils.** They are very silty and can destabilize;
- Soil should not be placed “dry” (dusty). CETCO should observe fill placement to determine acceptable soil moisture;
- Observation of fill “stability” is critical. The roller and earthwork equipment traversing over the new fill should be observed to document minimal movement occurs. This includes sheeps foot roller action observed to ensure the compactor is “walking out” of each lift;
- CETCO should observe and document fill placement and compaction operations.

Backfill Construction

These materials are placed in more confined areas than mass earthwork materials and therefore cannot be placed in full compliance with the previous recommendations. The following are general recommendations for backfill areas:

- Fill lift thicknesses will vary dependent on compaction equipment available and material types, but in no case should exceed 8 inches;
- For crushed stone/aggregate backfills in trenches or wall backfill, the lift thickness should not exceed 4 inches. Again, vibratory action on compaction equipment can destabilize the site soils. Average sized plate compactors usually do not have sufficient “force” (low weight and low wide spreading of vibration) to destabilize the soils and are approved for use. However, jumping jacks or very large plate compactors should not be used;
- Observation of stability and moisture should be similar to those mentioned previously;
- CETCO should provide addition recommendations for backfill.

Again, we recommend that site grading be started in the period from about late April to about November in order to prevent additional undercutting due to wet conditions. Drying of the site soils during other portions of the year is typically difficult.

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Site Drainage

Site drainage (water flow into, along and from the site) is key to minimize damaging effects of water flow. Excess water ponding can destabilize soils. Excessive water flow can erode soils and destabilize soils, especially at or near slopes.

For shallow groundwater seepage (less than 5 feet deep or so), the water encroaching upon construction excavations can be removed by placing a sump near the source of seepage and then pumping from the sump. Should heavy seepage occur, or should there be evidence of soil particle migration such as silting of the sump, then the geotechnical engineer should be contacted. **Wet zones are possible in the chert lenses and sandy zones and wet conditions should be expected at or near 8 feet or more depth.**

The following are general guidelines for site drainage.

- For all earthwork operations, positive surface drainage is prudent to keep water from ponding on the surface and to assist in maintaining surface stability;
- The surface should be sealed prior to expected wet weather. This can usually be accomplished with rubber-tired construction equipment or a steel-drum roller;
- During construction, water should not be allowed to pond in excavations or undercutting will likely be required;
- During the life of the project, slope the subgrade and other site features so that surface water flows away from the site structures;
- Future building structure roof drains should be piped away to proper storm drainage systems;
- Diversion ditches should be used at the toe of all slopes to keep surface water from accumulating at or near site structures;
- For excavations during construction, most free water from the subsurface conditions could likely be removed via sump pumps and open channel flow (ditches) at or near the source of seepage. However, if normal dewatering measures prove insufficient, CETCO should be retained to provide recommendations on the issue;

4.3 CUT/FILL SLOPES

The anticipated cuts and fills will likely create soil slopes of less than 5 to 7 feet. Higher slopes will require additional input from CETCO. For general slope construction of these smaller slopes, we recommend the following as maximum limit.

General Maximum Allowable Slope Grading

Material	Slope Type	Steepest Permanent Slop
Soil	Cut or Fill	2H:1V*

* For mowing and maintenance considerations a 3H:1V or flatter slope may be more desirable.

The following are general slope construction guidelines:

- Any area within 10 horizontal feet of a structure should be constructed flat (minimal sloping to allow some surface water drainage away from the structure);
- Toes of slopes should have drainage ditches directing water away from the areas;
- For areas wider than 20 feet above the top of slopes, we recommend installing lined/ impervious diversion ditches to redirect surface water away from the fill slope surface;
- Compaction of soil fill near the edge of a slope is generally difficult due to poor confinement. We recommend fill slopes be constructed steeper than the above recommendations and then cut the resulting slope back to the design slope;
- Fill placed on side slopes must be placed in horizontal lifts starting at the toe of the slope while securely benching the new fill material into the existing slope. Continue to place the fill in horizontal lifts until final proposed grade is reached;

Guidelines for construction of cut soil slopes are not practical because of unpredictability of the natural soil strata changes and relative differences in soil strengths within very short distances. Also, water drainage in the natural soil mass is irregular. CETCO should be retained at the time of construction to provide guidance on cut soil slope construction.

4.4 SITE SEISMIC DESIGN

The Kentucky Building Code (KBC), as updated was reviewed to determine the Site Seismic Classification. Based on our review of geologic data, our experience, and subsurface conditions encountered, we recommend a Seismic SITE CLASS "D" for the site.

A detailed geotechnical earthquake engineering analysis was not performed. However, based on a review of published literature and our experience with similar subsurface conditions, we believe the potential for slope instability, liquefaction (sandy soils at the site are very clayey), and surface rupture due to faulting or lateral spreading resulting from earthquake motions is low.

4.5 FOUNDATIONS

The following recommendations are also based on the previously described project information, typical industrial building types, the subsurface conditions encountered in the borings, the results of laboratory testing, empirical correlations for the soil types encountered, and CETCO's analyses and experience.

Typically, the site conditions encountered and newly/properly compacted engineered fill can support most building types with shallow spread footings for loads of less than 150 kips. **A maximum allowable net bearing pressure of 2,000 pounds per square foot (psf) is recommended for footings bearing on firm or better native soils (silt, clay or sand) or compacted engineered fill (silt, clay or sand).** Additional design considerations for project foundations are outlined as follows:

- Design footings with a minimum dimension of 24 inches wide;
- Place all exterior footing bottoms to at least **30 inches below finished exterior grade** (due to silty soil encountered);

Shallow Foundation Construction Considerations

The soils encountered in this exploration may lose strength if they become wet during construction. Therefore, we recommend the foundation subgrades be protected from exposure to water. The following guides address protection of footing subgrades and our recommended remediation for any soft soils encountered.

- Bearing condition evaluations should be conducted using dynamic cone penetration (DCP) and hand auger borings at all footing locations in cut areas and areas with less than 3 feet of fill under footings.
- To protect against "moisture loss" or "soil drying" during warmer months, foundation concrete should be placed the same day as excavation.
- Remove any soils disturbed by exposure prior to foundation concrete placement.
- Level or suitably bench the foundation bearing area.
- Remove loose soil, debris, and excess surface water from the bearing surface prior to concrete placement.
- CETCO must observe all foundation excavations and provide recommendations for treatment of any unsuitable conditions encountered.

- **The on-site soils contain significant silt and can appear to be wet and unstable shortly after excavation and exposure to unconfined conditions.** However, most conditions should “tighten up” within a few hours of exposure. If they do not appear to be more stable/dry, a possible wet pocket could have been exposed or the soils may indeed be too soft. CETCO should be retained to evaluate actual conditions.

4.6 FLOOR SLABS

Normal conventional type slabs can be supported by engineered fill soils or native soils. The areas should be proof rolled at the direction of CETCO prior to slab gravel base placement. Further, the subgrade should be prepared according to the recommendations contained within this report. The following features are recommended as part of the floor slab construction:

- If possible, avoid construction of slabs during the hottest/driest months (typically July, August or September) due to potential “dry soil” conditions.
- Keep the crushed stone or gravel moist, but not wet, immediately prior to slab concrete placement to minimize curling of the slab due to differential curing conditions between the top and bottom of the slab.
- Retain CETCO to review the actual subgrade conditions prior to slab construction and make recommendations for any unsuitable conditions encountered.

4.7 PAVEMENT AREAS

No CBR testing was conducted. Our recommendations are based on a correlated CBR of 4 (for similar silty and silty sand soils). We have also assumed a 15 year life with a typical “educational facility pavement” EAL count (not including significant bus traffic). The most significant areas of traffic are assumed to be the main entrances and main intersections of the parking lot.

Pavement Area Subgrade Recommendations

Adequate soil/subgrade support is critical for any pavement area. Please refer the Earthwork section of this report for subgrade preparation. Prior to stone base placement we recommend an additional proofroll of the subgrade should be performed to verify subgrade conditions. Recommendations for undercutting/repair of the subgrade can be made at that time by CETCO.

Pavement Drainage

Adequate drainage and slope of the pavement subgrade and pavement section should be provided to promote adequate drainage. Edges of the pavement should be provided a means of water outlet by extending the aggregate base course through to side ditches or providing drain pipes and weep holes at catch basin walls.

Light Duty Parking

Based on the above traffic and design parameters and our experience with similar projects, we recommend using the following pavement section for parking lot areas:

Parking Pavement Sections

Component	Parking Lots Only
Surface Course	1
Asphalt Base Course	2
Base Material (DGA)	8

Heavy Duty Pavement

For entrances, main roads, main drives and all loading dock areas, we recommend the following pavement section:

Heavy-Duty Pavement Sections

Component	Parking Lots Only
Surface Course	1
Asphalt Base Course	3
Base Material (DGA)	10

If a bus traffic or similar heavily traffic area is planned, we should be contacted for additional recommendations.

All asphalt should be mixed, placed, and compacted in accordance with Kentucky Transportation Cabinet Standard Specifications. Also, the dense graded aggregate (DGA) should be placed and compacted in accordance with KyTC Specifications.

Dumpster Areas

The dumpster pad and dumpster unloading area should be concrete pavement. At least 6 inches of concrete thickness should be used overlying at least 6 inches of compacted DGA base stone.

4.8 POST-REPORT GEOTECHNICAL CONSULTING

CETCO services as “geotechnical engineer of record” include answering questions pertaining to the materials presented in this report and the appendix. However, if conditions arise during construction that are different than those encountered during our exploration or if additional recommendations are needed, CETCO should be retained to provide that guidance. Construction observation and testing are beyond the typical scope of the geotechnical engineer, but are essential to completing the geotechnical engineer’s anticipated completion of their recommendations. CETCO should always be contracted as the testing/inspection firm for any project that applies their geotechnical report information. This always saves time, risk and project costs.

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5 NOTES ON THE REPORT

The assessment of site environmental conditions or the presence of contaminants in the soil, rock, surface water or groundwater of the site was beyond the scope of this exploration.

The recommendations provided are based in part on project information provided to us and they only apply to the specific project and site discussed in this report. If the project information section in this report contains incorrect information or if additional information is available, you should convey the correct or additional information to us and retain us to review our recommendations. We can then modify our recommendations if they are inappropriate for the proposed project.

Regardless of the thoroughness of a geotechnical exploration, there is always a possibility that conditions between borings/test pits will be different from those at specific boring/test pit locations and that conditions will not be as anticipated by the designers or contractors. In addition, the construction process may itself alter soil conditions. Therefore, experienced geotechnical personnel should observe and document the construction procedures used and the conditions encountered. Unanticipated conditions and inadequate procedures should be reported to the design team along with timely recommendations to solve the problems created. We recommend that the owner retain CETCO to provide this service based upon our familiarity with the project, the subsurface conditions and the intent of the recommendations.

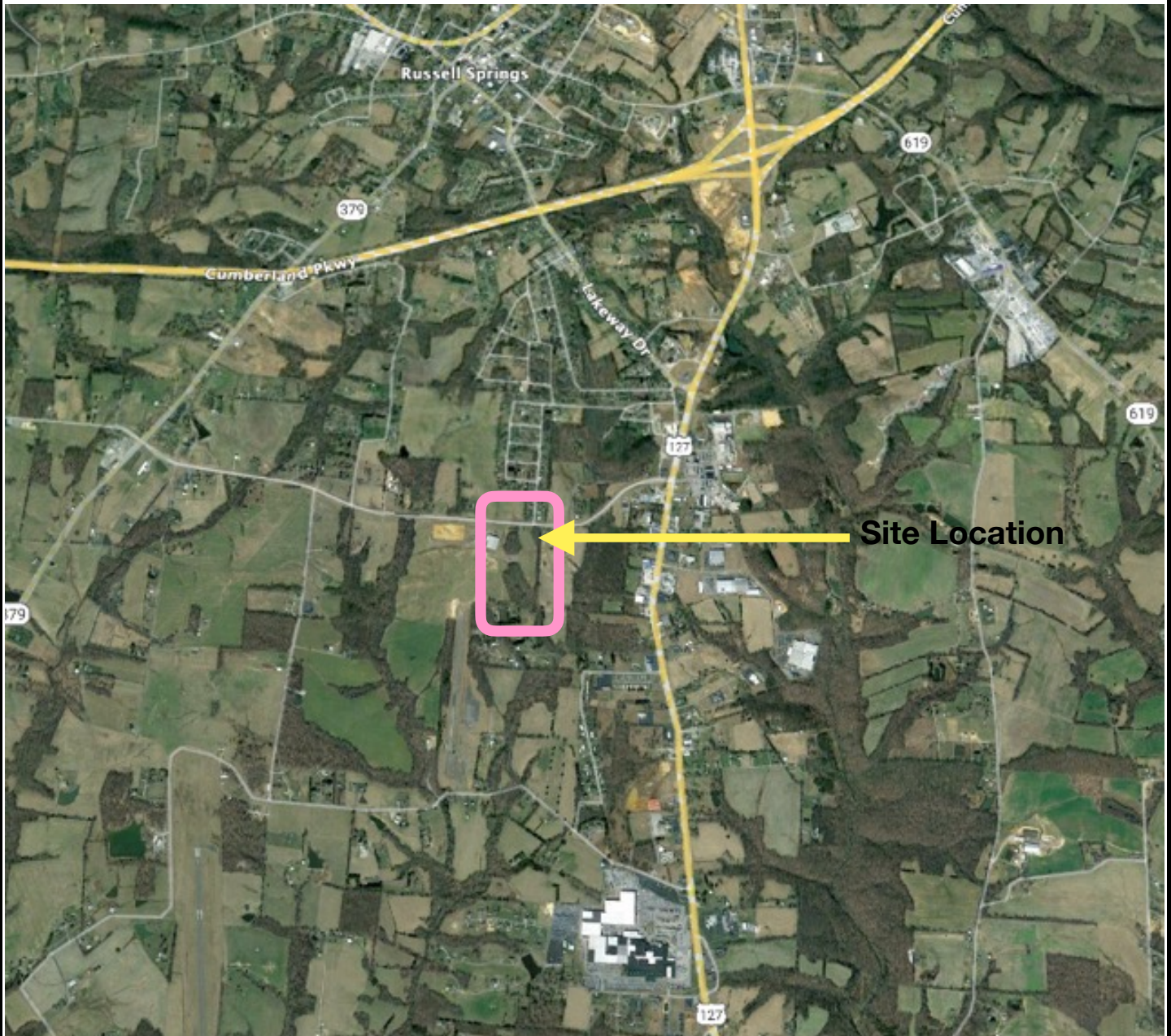
We recommend that this complete report be provided to the various design team members, the contractors and the project owner. Potential contractors should be informed of this report in the "instructions to bidders" section of the bid documents. The report should not be included or referenced in the actual contract documents.

We wish to remind you that our exploration services include storing the samples collected and making them available for inspection for 30 days. The samples are then discarded unless you request otherwise.

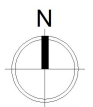


APPENDIX

**SITE LOCATION PLAN
BORING LOCATION PLAN
TEST BORING LOGS
FIELD STANDARDS
LABORATORY TESTING
LABORATORY STANDARDS**



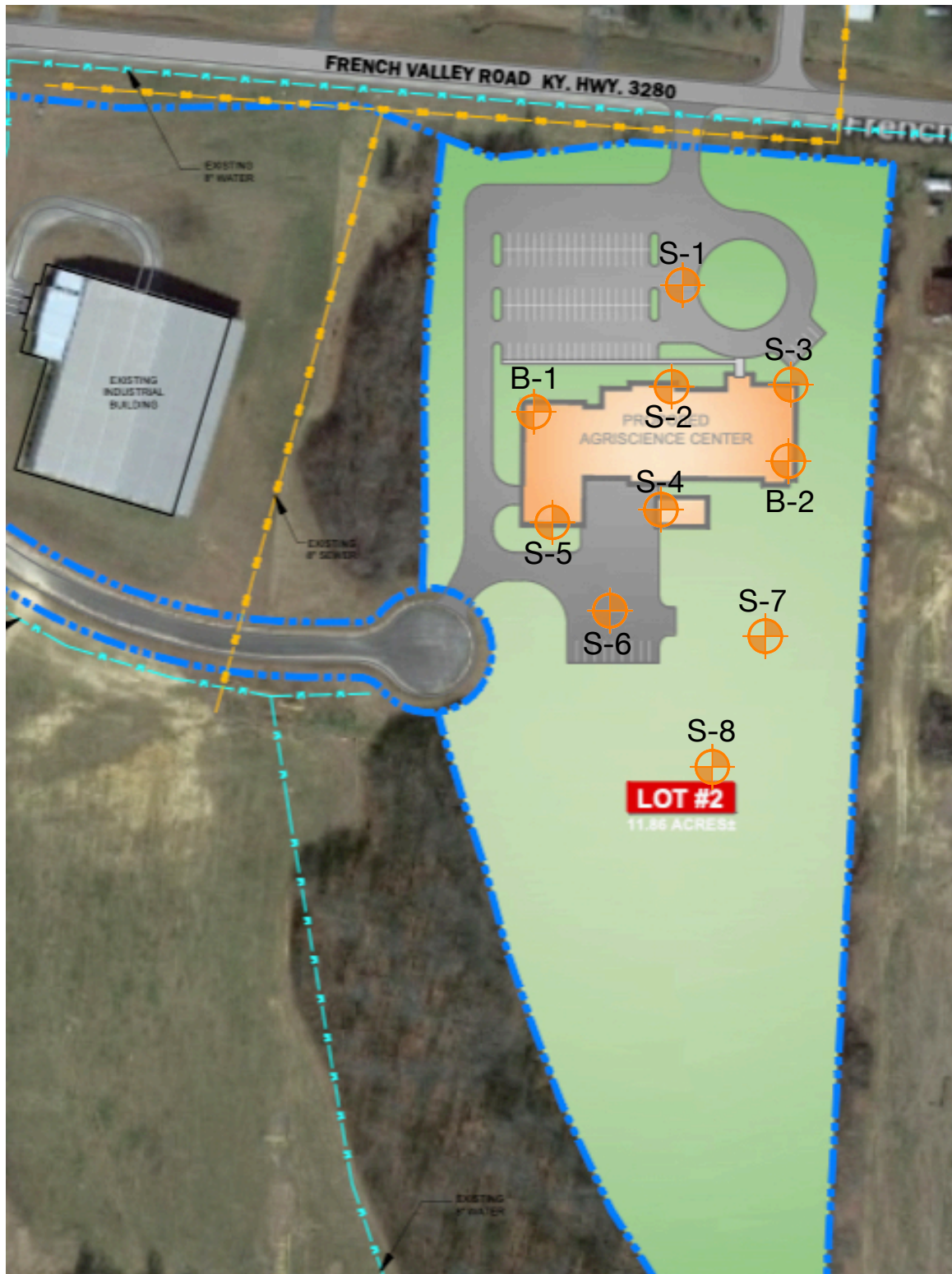
Site location plan adapted from Google Earth Pro, with further adaptations from CETCO professionals.



CETCO, PLLC
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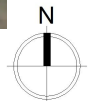
SITE LOCATION PLAN
for
Russell Co. Ag-Tech
Russell Springs, Kentucky

CETCO Project: 1776-22-0103
Date: May 5, 2022
Checked by: JSC
Drawing: 1 of 1



B-X or S-X
(Borings or
Soundings)

Boring location plan adapted from MSE Site Plan and Google Earth Pro Aerial, with further adaptations from CETCO professionals. Locations are approximate.



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BORING LOCATION PLAN
for
Russell Co. Ag-Tech
Russell Springs, Kentucky

CETCO Project: 1776-22-0103
Date: May 5, 2022
Checked by: JSC
Drawing: 1 of 1, Scale: NTS

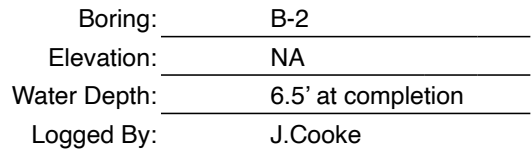


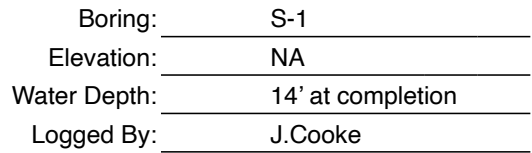
Project: Russell Co. Ag-Tech
 Job Number: 1776-22-0103
 Location: Russell Springs, KY
 Date: 4/21/2022

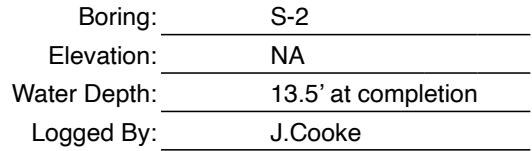
Boring: B-1
 Elevation: NA
 Water Depth: 7.5' at completion
 Logged By: J.Cooke

Driller	Drill Rig	Method	Hammer	Weather and Temperature
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Depth (ft.)		Description	Sample Depth		SPT Blow Count			Recovery	SPT	UD	Core
From	To		From	To	6"	6"	6"				
0.0	0.7	Topsoil	0.0	1.5	1	2	2	1.5'	X	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0.7	2.0	Light brown and orange, LEAN CLAY	1.5	3.0	5	7	9	1.5'	X	<input type="checkbox"/>	<input type="checkbox"/>
		(CL), silty, with fine sand, very moist,							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		FIRM	4.0	5.5	5	5	6	1.3'	X	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.0	7.0	Red and orange, LEAN CLAY (CL)	6.5	8.0	4	8	17	1.5'	X	<input type="checkbox"/>	<input type="checkbox"/>
		and SAND (SM), very silty, with light							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		brown striations, moist, STIFF/FIRM	9.0	10.5	23	23	36	1.4'	X	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.0	10.0	Light brown, with black concretions,	14.0	15.5	11	30	33	1.4'	X	<input type="checkbox"/>	<input type="checkbox"/>
		SAND (SM), with some silt, fine to							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		medium, very moist to wet, FIRM to	19.0	20.5	1	1	1	1.5'	X	<input type="checkbox"/>	<input type="checkbox"/>
		DENSE							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			24.0	25.5	3	4	4	1.5'	X	<input type="checkbox"/>	<input type="checkbox"/>
10.0	18.0	Gray, with orange and brown, SAND							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		(SM), with gravel, very moist to wet,							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		DENSE							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18.0	25.5	Orange brown and red, SAND (SC),							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		with clayey zones, medium, wet,							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VERY LOOSE. Layered in the last 2							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		feet.							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		BORING TERMINATED AT 25.5							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		FEET WITHOUT REFUSAL							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

[illegible]

[illegible]

[illegible]



Project: Russell Co. Ag-Tech
 Job Number: 1776-22-0103
 Location: Russell Springs, KY
 Date: 4/21/2022

Boring: S-3
 Elevation: NA
 Water Depth: 13' at completion
 Logged By: J.Cooke

Driller	Drill Rig	Method	Hammer	Weather and Temperature
X Strata Group <input type="checkbox"/> _____ <input type="checkbox"/> _____ <input type="checkbox"/> _____	<input type="checkbox"/> Mobile B-80 <input type="checkbox"/> Mobile B-34 <input type="checkbox"/> CME- 550 <input type="checkbox"/> CME- 55 <input checked="" type="checkbox"/> Acker Rebel	X 4" OD SFA <input type="checkbox"/> 4 1/4" ID HSA <input type="checkbox"/> 3 1/4" ID HSA <input type="checkbox"/> _____	Manual <input checked="" type="checkbox"/> Automatic Safety	<u>Cloudy to P.C., 60's</u> _____ _____

Depth (ft.)		Description	Sample Depth		SPT Blow Count			Recovery	SPT	UD	Core
From	To		From	To	6"	6"	6"				
		SOUNDING ONLY. DESCRIPTIONS							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		BASED ON OBSERVATIONS AND							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		RECOVERED AUGER CUTTINGS.							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0.0	1.2	TOPSOIL							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.2	5.5	Brown LEAN CLAY (CL), silty, moist							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.5	6.1	Floater?							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.1	13	Orange brown, silty fine SAND (SM),							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		very moist to wet. NOTE: VERY							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		SOFT LAYERS IN THIS ZONE							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		(drilling observations)							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	16	Orange brown, silty fine SAND (SM),							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		with some gravel, wet							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	20	Orange brown and gray, SAND (SM),							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		with numerous gravel lenses and							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		possible floaters, wet							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		BORING TERMINATED AT 20 FEET							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		WITHOUT REFUSAL							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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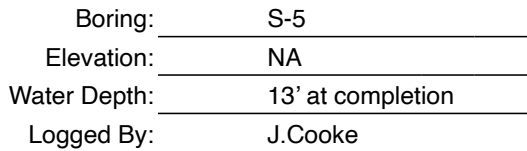


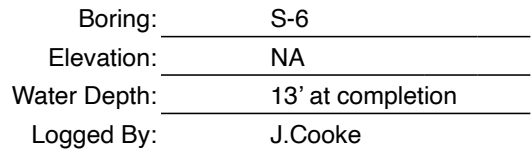
Project: Russell Co. Ag-Tech
 Job Number: 1776-22-0103
 Location: Russell Springs, KY
 Date: 4/21/2022

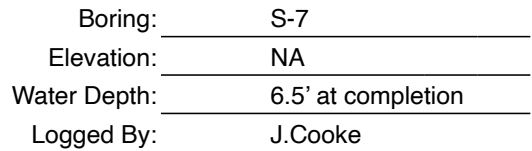
Boring: S-4
 Elevation: NA
 Water Depth: 13.5' at completion
 Logged By: J.Cooke

Driller	Drill Rig	Method	Hammer	Weather and Temperature
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Depth (ft.)		Description	Sample Depth		SPT Blow Count			Recovery	SPT	UD	Core
From	To		From	To	6"	6"	6"				
		SOUNDING ONLY. DESCRIPTIONS							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		BASED ON OBSERVATIONS AND							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		RECOVERED AUGER CUTTINGS.							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0.0	1.0	TOPSOIL							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.0	3.5	Brown, LEAN CLAY (CL), silty, moist,							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5	6	Gravel lenses with orange clay							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	8	Orange brown, silty fine SAND (SM),							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		very moist							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	15	Gray to orange brown, silty fine							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		SAND (SM), wet. NOTE: VERY							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		SOFT FROM 13.5 TO 15 FEET							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		(drilling observation)							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	20	Orange brown, silty fine SAND (SM),							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		with gravel, wet. NOTE: DRILLED							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		FIRM (drilling observation)							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		BORING TERMINATED AT 20 FEET							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		WITHOUT REFUSAL							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>





[illegible]



Project: Russell Co. Ag-Tech
 Job Number: 1776-22-0103
 Location: Russell Springs, KY
 Date: 4/21/2022

Boring: S-8
 Elevation: NA
 Water Depth: 10' at completion
 Logged By: J.Cooke

Driller	Drill Rig	Method	Hammer	Weather and Temperature
X Strata Group <input type="checkbox"/> _____ <input type="checkbox"/> _____ <input type="checkbox"/> _____	<input type="checkbox"/> Mobile B-80 <input type="checkbox"/> Mobile B-34 <input type="checkbox"/> CME- 550 <input type="checkbox"/> CME- 55 <input checked="" type="checkbox"/> X Acker Rebel	X 4" OD SFA <input type="checkbox"/> 4 1/4" ID HSA <input type="checkbox"/> 3 1/4" ID HSA <input type="checkbox"/> _____	Manual <input checked="" type="checkbox"/> Automatic Safety	<u>Cloudy to P.C., 60's</u> _____ _____

Depth (ft.)		Description	Sample Depth		SPT Blow Count			Recovery	SPT	UD	Core
From	To		From	To	6"	6"	6"				
		SOUNDING ONLY. DESCRIPTIONS							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		BASED ON OBSERVATIONS AND							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		RECOVERED AUGER CUTTINGS.							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0.0	0.8	TOPSOIL							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0.8	2	Brown, LEAN CLAY (CL), silty, moist,							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	8	Brown, silty fine SAND (SM), very							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		moist							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	8.5	Gravelly lenses							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.5	12.5	Orange and grayish brown, silty							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		fine SAND (SM), with some gravel,							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		wet							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.5	18.3	Gray, silty fine SAND (SM), wet							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		and soft (drilling observation)							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18.3	20	Gravel lenses with some sand/clay,							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		wet							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		BORING TERMINATED AT 20 FEET							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		WITHOUT REFUSAL							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
									<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Laboratory Testing Summary Table

Project Name: Russell Co. Ag-Tech Date: April 26, 2022

Project Location: Russell Springs, KY Reviewed by: Joe Cooke, PE

Client: Russell Co. Industrial Authority CETCO Project Number: 1776-22-0103

Sample ID	Depth (ft)	Natural Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Finer than #200 Sieve	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
B-1, 4-5.5'	4-5.5	33.8	47	31	16	45.1		
B-1, 9-10.5'	9-10.5	26.5				13.7		
B-1, 0-1.5'	0-1.5	20.5						
B-1, 1.5-3'	1.5-3	29.6						
B-1, 6.5-8'	6.5-8	26.5						
B-1, 14-15.5'	14-15.5	28.5						
B-1, 19-20.5'	19-20.5	53.4						
B-2, 0-1.5'	0-1.5	17.1						
B-2, 1.5-3'	1.5-3	21.4						
B-2, 4-5.5'	4-5.5	28.8						
B-2, 6.5-8'	6.5-8	25.0						
B-2, 9-9.5'	9-9.5	24.1						
B-2, 14-15.5'	14-15.5	27.8						
B-2, 19-20.5'	19-20.5	58.6						
B-2, 24-25.5'	24-25.5	40.0						

Atterberg Limits Chart

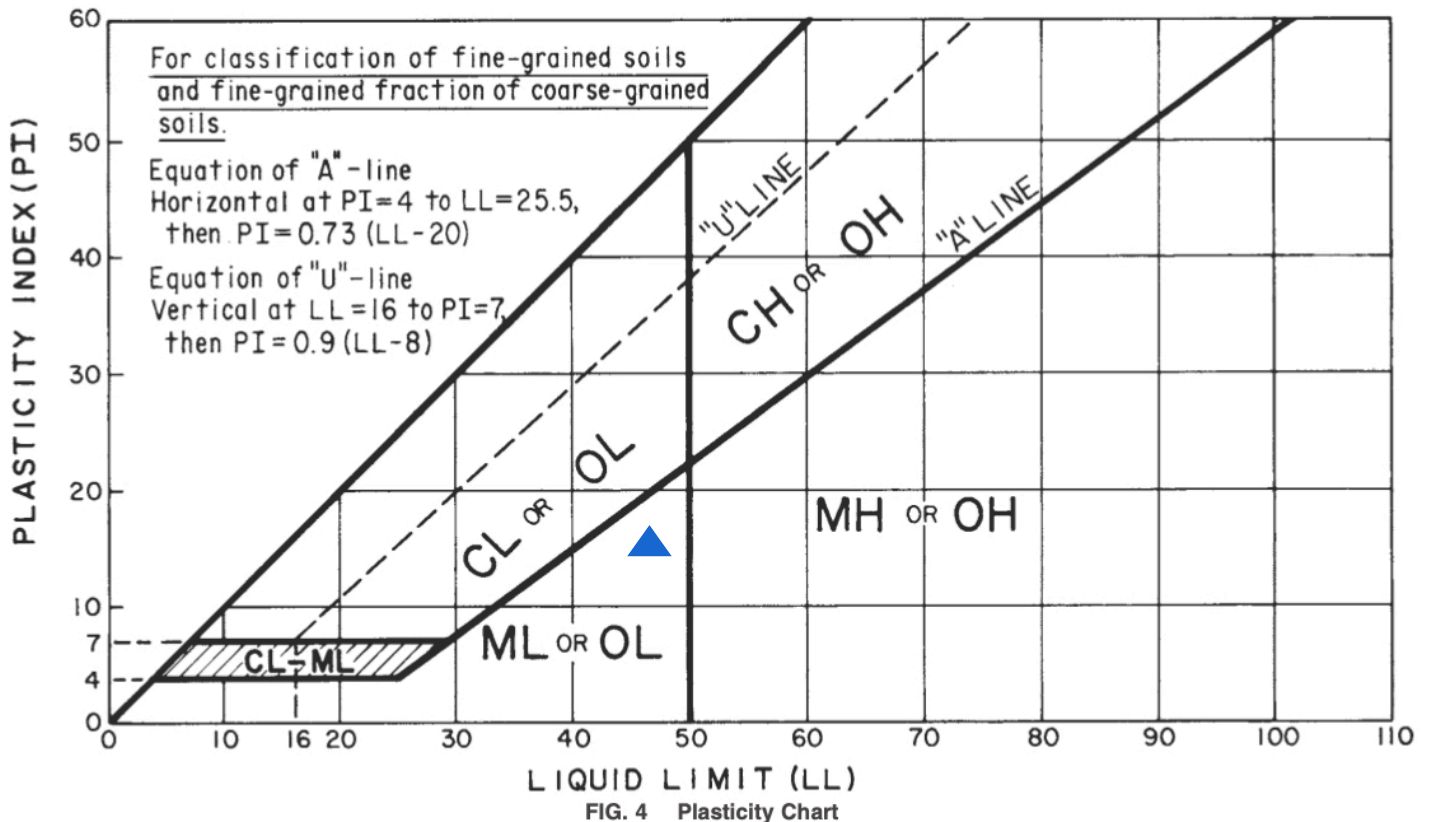
Project Name: Russell Co. Ag-Tech Date: April 26, 2022

Project Location: Russell Springs, KY Reviewed by: Joe Cooke, PE

Client: Russell Co. Industrial Authority CETCO Project Number: 1776-22-0103

"Atterberg Limits", ASTM D4318

Sample ID	Depth (ft)	Natural Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Finer than #200 Sieve
B-1, 4.0'-5.5'	4-5.5	33.8	47	31	16	45.1





LABORATORY STANDARDS AND PROCEDURES

Soil Classification: Soil classifications provide a general guide to the engineering properties of various soil types and enable the engineer to apply past experience to current problems. In our investigations, samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer. The soils are classified according to consistency (based on number of blows from standard penetration tests or “by hand” stiffness), color and texture. These classification descriptions are included on our “Boring Logs” or “Test Pit Logs”

The classification system discussed above is primarily qualitative and for detailed soil classification two laboratory tests are necessary: grain size tests and plasticity tests. Using these test results the soil can be classified according to the AASHTO or Unified Classification Systems (ASTM D2487). Each of these classification systems and the in-place physical soil properties provides an index for estimating the soil's behavior. The soil classification and physical properties obtained are presented in this report.

Atterberg Limits: Portions of the samples are taken for Atterberg Limits testing to determine the plasticity characteristics of the soil. The plasticity index (PI) is the range of moisture content over which the soil deforms as a plastic material. It is bracketed by the liquid limit (LL) and the plastic limit (PL). The liquid limit is the moisture content at which the soil becomes sufficiently “wet” to flow as a heavy viscous fluid. The plastic limit is the lowest moisture content at which the soil is sufficiently plastic to be manually rolled into tiny threads. The liquid limit and plastic limit are determined in accordance with ASTM D4318.

Moisture Content: The Moisture Content is determined according to ASTM D2216.

Percent Finer Than 200 Sieve: Selected samples of soils are washed through a number 200 sieve to determine the percentage of material less than 0.074 mm in diameter.

“Proctor” (Moisture-Density Test): Often called by its original author's name, the “Proctor” test is a moisture-density relationship test to determine “maximum dry density” and “optimum moisture content” curves using a set amount of force of “compaction” at variable moisture contents in a pre-determined mold size. The test is typically ASTM D698, method A, for standard effort. For a “modified” effort (higher amount of force), ASTM D 1557, again method A, is usually used. Due to high amounts of clay as well as typical compaction construction equipment used, the standard Proctor (ASTM D698) is the most common method used. For materials with larger grain sizes, methods B, C and D of each ASTM method can be used.

Rock Strength Tests: To obtain strength data for rock materials encountered, unconfined compression tests are performed on selected samples. In the unconfined compression test, a cylindrical portion of the rock core is subjected to increasing axial load until it fails. The pressure required to produce failure is recorded, corrected for the length to diameter ratio of the core and reported.

FIELD SERVICES STANDARDS AND PROCEDURES

Field Operations: The general field procedures employed by CETCO are summarized in ASTM D420 which is entitled “Investigating and Sampling Soils and Rocks for Engineering Purposes.” This recommended practice lists recognized methods for determining soil and rock distribution and ground water conditions. These methods include geophysical, in situ methods and test pits as well as borings.

Borings are drilled to obtain subsurface samples using one of several alternate techniques depending upon the subsurface conditions. These techniques typically include:

- a. Continuous 2-1/2 or 3-1/4 inch I.D. hollow stem augers;
- b. Wash borings using roller cone or drag bits (mud or water);
- c. Continuous flight augers (ASTM D 1425).



These drilling methods are not capable of penetrating through material designated as "refusal materials." Refusal, thus indicated, may result from hard cemented soil, soft weathered rock, coarse gravel or boulders, thin rock seams, or the upper surface of sound continuous rock. Core drilling procedures are required to determine the character and continuity of refusal materials.

The subsurface conditions encountered during drilling are reported on a field test boring record by our field personnel (typically engineers). The record contains information concerning the boring method, samples attempted and recovered, indications of the presence of various materials such as coarse gravel, cobbles, etc., and observations between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are on file in our office.

The soil and rock samples plus the field boring records are reviewed by a geotechnical engineer. The engineer classifies the soils in general accordance with the procedures outlined in ASTM D2488 and prepares the final boring records which are the basis for all evaluations and recommendations.

The final boring records represent our interpretation of the contents of the field records based on the results of the engineering examinations and tests of the field samples. These records depict subsurface conditions at the specific locations and at the particular time when drilled. Soil conditions at other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in a change in the subsurface soil and ground water conditions at these boring locations. The lines designating the interface between soil or refusal materials on the records and on profiles represent approximate boundaries. The transition between materials may be gradual. The final boring records are included with this report.

The detailed data collection methods used during this study are discussed on the following pages.

Soil Test Borings: Soil test borings were made at the site at locations shown on the attached Boring Plan. Soil sampling and penetration testing were performed in accordance with ASTM D1586.

The borings were made by mechanically twisting a hollow stem steel auger into the soil. At regular intervals, the drilling tools were removed and soil samples obtained with a standard 1.4 inch I.D., 2 inch O.D., split tube sampler. The sampler was first seated 6 inches to penetrate any loose cuttings, then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot was recorded and is designated the "penetration resistance". The penetration resistance, when properly evaluated, is an index to the soil strength and foundation supporting capability.

Representative portions of the soil samples, thus obtained, were placed in glass jars and transported to the laboratory. In the laboratory, the samples were examined to verify the driller's field classifications. Test Boring Records are attached which graphically show the soil descriptions and penetration resistances.

Core Drilling: Refusal materials are materials that cannot be penetrated with the soil drilling methods employed. Refusal, thus indicated, may result from hard cemented soil, soft weathered rock, coarse gravel or boulders, thin rock seams or the upper surface of sound continuous rock. Core drilling procedures are required to determine the character and continuity of refusal materials.

Prior to coring, casing is set in the drilled hole through the overburden soils, if necessary, to keep the hole from caving. Refusal materials are then cored according to ASTM D2113 using a diamond-studded bit fastened to the end of a hollow double tube core barrel. This device is rotated at high speeds, and the cuttings are brought to the surface by circulating water. Core samples of the material penetrated are protected and retained in the swivel-mounted inner tube. Upon completion of each drill run, the core barrel is brought to the surface, the core recovered is measured, the samples are removed and the core is placed in boxes for storage.

The core samples are returned to our laboratory where the refusal material is identified and the percent core recovery and rock quality designation is determined by a soils engineer or geologist. The percent core recovery is the ratio of the sample length obtained to the depth drilled, expressed as a percent. The rock quality designation (RQD) is obtained by summing

Field and Lab Procedures



up the length of core recovered, including only the pieces of core which are four inches or longer, and dividing by the total length drilled. The percent core recovery and RQD are related to soundness and continuity of the refusal material. Refusal material descriptions, recoveries, and RQDs are shown on the "Test Boring Records".

Water Level Readings: Water table readings are normally taken in conjunction with borings and are recorded on the "Boring Logs". These readings indicate the approximate location of the hydrostatic water table at the time of our field investigation. Where impervious soils are encountered (clayey soils) the amount of water seepage into the boring is small, and it is generally not possible to establish the location of the hydrostatic water table through water level readings. The ground water table may also be dependent upon the amount of precipitation at the site during a particular period of time. Fluctuations in the water table should be expected with variations in precipitation, surface run-off, evaporation and other factors.

The time of boring water level reported on the boring records is determined by field crews as the drilling tools are advanced. The time of boring water level is detected by changes in the drilling rate, soil samples obtained, etc. Additional water table readings are generally obtained at least 24 hours after the borings are completed. The time lag of at least 24 hours is used to permit stabilization of the ground water table which has been disrupted by the drilling operations. The readings are taken by dropping a weighted line down the boring or using an electrical probe to detect the water level surface.

Occasionally the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the caved-in zone. The cave-in depth is also measured and recorded on the boring records.

Rock Classification: Rock classifications (if any) provide a general guide to the engineering properties of various rock types and enable the engineer to apply past experience to current situations. In our explorations, rock core samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer. The rock cores are classified according to relative hardness and RQD (see Guide to Rock Classification Terminology), color, and texture. These classification descriptions are included on our Boring Records.

Test Pits: Occasionally, our field sampling includes the use of "test pits". Similarly to soil test borings, our classifications on the materials observed and sampled are performed in general accordance with ASTM standards. These excavations are performed by excavators of various sizes and the width/length/depth of the excavations vary as well. Typically, only the soil or "loose" rock areas can be sampled or excavated. The samples taken are usually taken at highly variable depths and the engineer or field personnel have extreme discretion on the sample sizes and locations. These are typically sealed in "zip lock" type baggies and transported back to our office for lab testing and further classification. Visual descriptions of rock materials (sand, gravel, cobbles, boulders, etc.) are provided on both samples taken and observations of spoils removed and sides of excavations. Typically, photos of both the mass excavation and spoil pile are provide on the test pit logs in our reports. Groundwater levels are noted and can include water flow at the excavation bottom or at points of depth in the excavation sides. "Refusal" usually means that the excavator cannot remove additional materials at the excavation bottom. Some excavations may also have very large boulders than cannot be removed by the excavator used. Depths indicated on the logs are usually measured with steel tape or cloth tape. Final complete details of the test pit findings and opinions are provided in the "Test Pit Logs" in our reports. Lastly, test pit excavations have no set standards and are performed at our engineers discretion.

SECTION 03310 - CONCRETE WORK

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Extent of concrete work is shown on drawings.
- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not limited to, General Conditions, Supplementary Conditions, and Division 1 of these Specifications.

1.02 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following codes, specifications and standards, except where more stringent requirements are shown or specified:
 - 1. ACI 301 "Specifications for Structural Concrete for Buildings"
 - 2. ACI 318 "Building Code Requirements for Reinforced Concrete"
 - 3. Concrete Reinforcing Steel Institute, "Manual of Standard Practice."
- B. Concrete Testing Services
 - 1. Engage a testing laboratory acceptable to Architect/ Engineer to perform material evaluation tests and to design concrete mixes.
 - 2. Owner will engage testing laboratory to perform sampling and testing during placement of concrete.
 - 3. Owner will engage a testing laboratory to conduct tests of compression test specimens.
 - 4. Materials and installed work may require testing and retesting as directed by Architect/ Engineer, at any time during progress of work. Allow free access to material stockpiles and facilities. Re-testing of rejected materials and installed work shall be done at Contractor's expense.

1.03 SUBMITTALS

- A. Product Data: Submit data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, joint systems, curing compounds, and others as requested by Architect/ Engineer.
- B. Shop Drawings - Reinforcement: Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required at openings through concrete structures.
- C. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design test as specified.
- D. Material Certificates: Provide materials certificates in lieu of materials laboratory test

reports when permitted by Architect/ Engineer. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

PART 2 - PRODUCTS

2.01 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection. Use plywood complying with U. S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- C. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

2.02 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A615, Grade 60, deformed.
- B. Welded Wire Fabric: ASTM A185, welded steel wire fabric.
- C. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI specifications, unless otherwise acceptable.
 - 1. For exposed-to-view concrete surfaces: Where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

2.03 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150, Type I, unless otherwise acceptable to Architect/ Engineer. Use one brand of cement throughout project, unless otherwise acceptable to Architect/ Engineer.
- B. Fly Ash: ASTM C618, Type C or Type F. Loss on ignition shall not exceed 3½%. Limit

use of fly ash to not exceed 25% of total cementitious material content by weight. Higher limits are acceptable for CLSM.

- C. Normal Weight Aggregates: ASTM C33, and as herein specified. Provide aggregates from a single source for exposed concrete.
 - 1. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious substances.
- D. Water: Drinkable.
- E. Admixtures: The amount of water soluble chloride ions added to the mix by the admixtures shall not exceed 0.3% by weight of cement. Provide admixture manufacturer's written certification of weight of added chloride ions per ounce for each admixture.
 - 1. Air-Entraining Admixture: ASTM C260.
 - 2. Water-Reducing Admixture: ASTM C494, Type A
 - 3. Mid-Range Water-Reducing Admixture (MRWR): ASTM C494, Type A or Type F
 - 4. Water-Reducing, Non-Chloride Accelerator Admixture: ASTM C494 Type E
 - 5. Water-Reducing, Retarding Admixture: ASTM C494, Type D

2.04 RELATED MATERIALS

- A. Moisture Barrier: Provide moisture barrier cover over prepared base material where indicated. Use only materials which are resistant to decay when tested in accordance with ASTM E154, as follows:
 - 1. Polyethylene sheet not less than 6 mils thick.
- B. Non-Shrink Grout: CRD-C 621, factory pre-mixed grout.
- C. Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound complying with ASTM C309, Type I, Class A with % solids not less than 19%. Moisture loss not more than 0.03 gr./sq. cm. when applied at 300 square ft./gal.
- D. Bonding Compound: Polyvinyl acetate or acrylic base, rewettable type.
- E. Isolation joint (expansion joint):
 - 1. Provide preformed strips, non-extruding and resilient bituminous type, of thickness indicated, complying with ASTM D1751.
 - 2. If sealants specified in Section 07920 are used in the joints built under this Section, Contractor will provide a filler complying with ASTM D1752.

2.05 PROPORTIONING AND DESIGN OF MIXES

- A. Mix designs shall be prepared by personnel with KRMCA Level II Certification or equal. Prepare design mixes for each type and strength of concrete as follows:
1. Prepare concrete mixes, other than slab on grade concrete in accordance with ACI 301 Section 4.2.3
 2. Prepare slab on grade concrete mixes in accordance with ACI 302 Section 5.2.4 (Method B).
- B. Submit written reports to Architect/ Engineer of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by Architect/ Engineer.
- C. Design mixes to provide normal weight concrete with the following properties, as indicated on drawings and schedules:
1. 3500 psi 28-day compressive strength
 2. 3000 psi 28-day compressive strength
 3. 1000 psi 28-day compressive strength - CLSM
 4. 500 psi 28-day compressive strength - CLSM
 5. 100 psi 28-day compressive strength - CLSM
- D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner, and as accepted by Architect/ Engineer. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect/ Engineer before using in work.
- E. Admixtures:
1. Use water-reducing admixture or mid range water-reducing admixture in concrete as required for placement and workability. The use of a water-reducing admixture is required for slabs on grade.
 2. Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 degrees F. (10 degrees C.).
 3. Use air-entraining admixture in exterior exposed concrete. 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-or-minus 1½% within following limits:
 - a. Concrete structures and slabs exposed to freezing and thawing or de-icer chemicals
5.5% 1-1/2" maximum aggregate.
6.0% 1" maximum aggregate.
6.0% 3/4" maximum aggregate.
 4. Use admixtures for water-reducing and set-control in strict compliance with

manufacturer's directions.

- F. Water-Cement Ratio: Water-Cement ratio shall not exceed 0.53.
- G. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
 - 1. Ramps, slabs, and sloping surfaces: 4 inches.
 - 2. Concrete containing a mid-range water-reducing admixture (MRWR): Not more than 6 inches after addition of MRWR to site verified 2 inch to 3 inch slump concrete.
 - 3. Other Concrete: 4 inches.
- H. Concrete Mixes:
 - 1. Ready-Mix Concrete: Comply with requirements of ASTM C94 and as herein specified. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required.
- I. Controlled Low Strength Material (CLSM):
 - 1. Controlled Low Strength Material (flowable fill): A low strength mixture consisting of portland cement, sand, class F fly ash and water.
 - 2. Design mixes shall comply with the recommendations of the Kentucky Ready-Mix Concrete Association.

PART 3 - EXECUTION

3.01 FORMS

- A. Design, erect, support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position.
- B. Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.
- C. Construct forms to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.
- D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.
- E. Provide temporary openings where interior area of formwork is inaccessible for cleanout,

for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.

- F. Chamfer exposed corners and edges as indicated, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- G. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal. Unless otherwise indicated, provide ties so portion remaining within concrete after removal is 1" inside concrete and will not leave holes larger than 1" diameter in concrete surface.
- H. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses and chases from trades providing such items. Accurately place and securely support items built into forms.
- I. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retighten forms and bracing after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

3.02 PLACING REINFORCEMENT

- A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.
- C. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.
- D. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.03 JOINTS

- A. Construction Joints: Locate and install construction joints as indicated or, if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to Architect/ Engineer.
- B. Provide keyways at least 1/1-2" deep in construction joints in walls; keyways in

construction joints in slabs to follow ACI recommendations for keyed construction joints.

- C. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise noted.
- D. Isolation (Expansion) Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs on grade and vertical surfaces, such as column pedestals, foundation walls, grade beams and elsewhere as indicated.
 - 1. Joint Filler and sealant materials are specified in Division 7 sections of these specifications.
- E. Contraction (Control) Joints in Slabs-on-Grade: Construct contraction joints in slabs-on-grade to form panels of patterns as shown.
 - 1. Contraction joints shall be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
 - 2. Joint sealant material is specified in Division 7 sections of these specifications.

3.04 INSTALLATION OF EMBEDDED ITEMS

- A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached thereto.
- B. Position and secure in place all embed items before placing concrete in forms.

3.05 PREPARATION OF FORM SURFACES

- A. Clean re-used forms of concrete matrix residue, repair and patch as required to return forms to acceptable surface condition.
- B. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.
- C. Thin form-coating compounds only with thinning agent of type and in amount and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.
- D. Coat steel forms with a non-staining, rust-preventive form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.06 CONCRETE PLACEMENT

- A. **Preplacement Inspection:** Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.
- B. Coordinate the installation of joint materials, perimeter insulation and moisture barriers with placement of forms and reinforcing steel.
- C. **General:** Comply with ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete" and as herein specified.
- D. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.
- E. **Placing Concrete in Forms:** Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
- F. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with recommended practices.
- G. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.
- H. Maintain reinforcing in proper position during concrete placement operations.
- I. **Cold Weather Placing:** Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.
 - 1. When air temperature has fallen to or is expected to fall below 40 degrees F (4 degrees C.), uniformly heat water and/or aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F (10 degrees C), and not more than 80 degrees F. (27 degrees C) at point of placement.
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt and other materials containing antifreeze agents or

chemical accelerators, unless otherwise accepted in mix designs.

- J. Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees F (32 degrees C). Mixing water may be chilled or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.
 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
 3. Fog spray forms, reinforcing steel and subgrade just before concrete is placed.
 4. Use water-reducing retarding admixture (Type D) when required by high temperatures, low humidity, or other adverse placing conditions.

3.07 FINISH OF FORMED SURFACES

- A. Rough Form Finish: For formed concrete surfaces not exposed to view in the finish work or by other construction, unless otherwise indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off.
- B. Smooth Form Finish: For formed concrete surfaces exposed to view or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, painting or other similar system. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.
- C. Smooth Rubbed Finish: Provide smooth rubbed finish to scheduled concrete surfaces, which have received smooth form finish treatment, not later than one day after form removal.
1. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strikeoff smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.08 MONOLITHIC SLAB FINISHES

- A. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified.
1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or by hand-floating if area is small or inaccessible to power units. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- B. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed to view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint or other thin film finish coating system.
1. After floating, begin first trowel finish operation using a power-driven trowel.
 2. Begin final troweling when surface produces a ringing sound as trowel is moved over surface.
 3. Consolidate concrete surface by final troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to the following tolerances:
Overall flatness and levelness: Ff 24, Fl 18
Minimum flatness and levelness: Ff 18, Fl 12
 4. Grind smooth surface defects which would telegraph through applied floor covering system.
- C. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.
- D. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps and ramps and elsewhere as indicated.
1. Immediately after trowel finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect/ Engineer before application.

3.09 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
1. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing.
 2. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

B. Curing Methods: Perform curing of concrete by moist curing, moisture-retaining cover curing, or curing and sealing compound as herein specified.

1. Moist curing: Provide moist curing by covering concrete surface with absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent covers.
2. Moisture-retaining cover curing: Provide moisture-retaining cover curing by covering concrete surfaces and edges with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing and sealing compound: Provide curing and sealing compound to interior slabs and to exterior slabs, walks, and curbs, as follows: Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Re-coat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
4. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting and other coatings and finish materials, unless otherwise acceptable to Architect/ Engineer.

C. Curing Formed Surfaces: Cure formed concrete surfaces, by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing methods specified above, as applicable.

D. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of curing and sealing compound unless otherwise noted.

1. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover unless otherwise directed.

3.10 REMOVAL OF FORMS

A. Formwork not supporting weight of concrete, such as sides of walls, piers, and similar parts of the work, may be removed after cumulatively curing at not less than 50 degrees F. (10 degrees C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.

3.11 REUSE OF FORMS

A. Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated or

otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.

- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to Architect/ Engineer.

3.12 MISCELLANEOUS CONCRETE ITEMS

- A. Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.
- B. Grout base plates and foundations as indicated, using specified non-shrink grout. Use non-metallic grout for exposed conditions, unless otherwise indicated.
- C. Reinforced Masonry: Provide concrete grout for reinforced masonry lintels and bond beams where indicated on drawings and as scheduled. Maintain accurate location of reinforcing steel during concrete placement.

3.13 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect/ Engineer.
 - 1. Cut out honeycomb, rock pockets, and voids over 1/4" in any dimension, down to solid concrete but, in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water and brush-coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.
- B. For exposed to view surfaces: Blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- C. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect/ Engineer. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets; fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.
- D. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.
- E. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for

smoothness and verify surface plane to tolerances specified for each surface and finish. Correct high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness using a template having required slope.

- F. Repair finished unformed surfaces that contain defects which affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.015" wide, spalling, pop-outs, honeycomb, rock pockets and other objectionable conditions.
- G. Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.
- H. Repair defective areas, except random cracks and single holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean square cuts and expose reinforcing steel with at least 3/4" clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Fill areas with concrete repair mortar. Place, compact and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- I. Repair isolated random cracks and single holes not over 1" in diameter with concrete repair mortar. Groove top of cracks and cut-out holes to sound concrete and clean of dust, dirt and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix repair mortar in accordance with manufacturers printed instructions. Place repair mortar after bonding compound has dried. Finish to match existing concrete. Keep patched area continuously moist for not less than 72 hours.
- J. Perform structural repairs with prior approval of Architect/ Engineer for method and procedure, using specified epoxy adhesive and mortar.
- K. Repair methods not specified above may be used, subject to acceptance of Architect/ Engineer.

3.14 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. The owner will engage a testing laboratory to perform and report compressive strength tests. All concrete sampling and testing shall be performed by an ACI certified level 1 technician.
- B. Sampling and testing for quality control during placement of concrete will include the following:
 - 1. Sampling Fresh Concrete: ASTM C172.
 - 2. Slump: ASTM C143: one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
 - 3. Air Content: ASTM C173, volumetric method for lightweight or normal weight concrete; ASTM C231 pressure method for normal weight concrete; one for each day's pour of each type of concrete.
 - 4. Concrete Temperature: Test hourly when air temperature is 40 degrees F (4 degrees C)

and below, and when 80 degrees F (27 degrees C) and above; and each time a set of compression test specimens is made.

5. Compression Test Specimen: ASTM C31; one set of 3 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
 6. Compressive Strength Tests: ASTM C39; one set for each day's pour exceeding 5 cubic yards plus additional sets for each 100 cubic yards over and above the first 50 cubic yards of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days. When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
- C. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive by more than 500 psi.
- D. Test results will be reported in writing to Architect/ Engineer and Owner within 24 hours that tests are made. Reports of compressive strength tests will contain the project identification name and number, date of concrete placement, slump and temperature at time of sampling, name of concrete testing service, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but will not be used as the sole basis for acceptance or rejection.
- F. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Architect/ Engineer. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods as directed. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

END OF SECTION

SECTION 03354

POLISHED CONCRETE FINISHING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Grinding and honing of the slab surface to receive clear reactive, penetrating liquid hardener/densifier to interior concrete.
 - 2. Application of clear reactive, penetrating liquid hardener.
 - 3. Progressively polishing and burnishing of the slab surface to achieve Finish Requirements.
 - 4. Application of stain resistant surface treatment.
- B. Related Requirements:
 - 1. Section 01 25 0- Substitution Procedures.
 - 2. Section 01 33 0- Submittal Procedures.
 - 3. Section 01 60 0- Product Requirements.
 - 4. Section 03 30 0- Cast-in-Place Concrete.
 - 5. Section 07 90 0- Joint Sealants.

1.02 REFERENCES

- A. The date of the standard that is in effect is the date of receipt of bids for the project.
- B. American Concrete Institute (ACI) – Specification for Polished Concrete Slab Finishes ACI 310.1-20.
- C. American National Standard Institute / National Floor Safety Institute
 - 1. ANSI/NFSI B101.1 Test Method for Measuring Wet SCOF of Common Hard-Surface Floor Materials.
 - 2. ANSI/NFSI B101.3-Test Method for Measuring Wet DCOF of Common Hard-Surface Floor Materials.
- D. American Society of Concrete Contractors (ASCC).
ASTM International (ASTM):
 - 1. C1353 – Standard Test Method for Abrasion Resistance of Dimension Stone Subjected to Foot Traffic Using a Rotary Platform, Double-Head Abraser
 - 2. D523- Standard Test Method for Specular Gloss.
 - 3. D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
 - 4. D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
 - 5. E96/96M Method B (Water Method) - Standard Test Methods for Water Vapor Transmission of Materials.
 - 6. G154 -Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Meeting: Convene before the start of work on new concrete slabs or patching of existing concrete slabs and start of application of concrete finish system.
 - 1. Require attendance of parties directly affecting work of this Section, including the Owner's Representative, Contractor, Architect, concrete installer, and applicator. Meeting should only convene when required parties are present.
 - 2. Review the following:
 - a. Physical requirements of completed concrete slab and slab finish.
 - b. Locations and time of test areas.
 - c. Protection of surfaces not scheduled for finish application.
 - d. Surface preparation.
 - e. Application procedure.
 - f. Quality control.
 - g. Cleaning.
 - h. Protection of finish system.
 - i. Coordination with other work.

1.04 SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturer's product data sheets and tested physical and performance properties on products to be used for the work.
- B. VOC Certification: Submit certification that products furnished comply with regulations controlling use of volatile organic compounds (VOC).
- C. Certificates:
 - 1. Certificates by manufacturer stating that installer is listed applicator of special concrete finishes, and has completed the necessary training programs.
- D. Floor Protection Plan.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Concrete Polishing Council (CPC) Craftsman Supervisor or equivalent on site during work.
 - 2. Applicator to be familiar with the specified requirements and the methods needed for proper performance of work of this section. Applicator must have availability of proper equipment to perform work within scope of this project on a timely basis. Applicator should have successfully performed a minimum of 5 projects of similar scope and complexity.
- B. Mock-up: On-site, prior to the start of the polished concrete finishing process.
 - 1. Require attendance of parties directly affecting work of this Section, including the Contractor, Architect, applicator, and Owner's Representative.
 - 2. Notify the above parties one week in advance of date and time when mock-up will be completed.
 - 3. Demonstrate the materials, equipment and application methods to be used for work specified herein in a pre-approved location approximately 50 sq. ft. in area or as directed by Architect or Owner's Representative.

4. Retain approved mock-up during construction as a standard for judging the completed work. Areas may remain as part of the completed work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original containers, with seals unbroken, bearing manufacturer labels indicating brand names and directions for storage.
- B. Store concrete hardener/densifier and surface protectant treatment in environment recommended on published manufacturer's product data sheets.
 1. Store containers upright in a cool, dry, well-ventilated place, out of the sun, with temperature between 40 and 100 degrees Fahrenheit.
 2. Protect from freezing.
 3. Store away from other chemicals and potential sources of contamination.
 4. Keep lights, fire, sparks, and heat away from containers.
 5. Do not drop containers or slide across sharp objects.
 6. Do not stack pallets more than three high.
 7. Keep containers tightly closed when not in use.

1.07 FIELD CONDITIONS

- A. Environmental limitations:
 1. Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting performance and finishing requirements.
- B. Close areas to traffic during floor application and after application for time period recommended in writing by manufacturer.
- C. Protect the completed slab to prevent damage by the other trades during floor completion.
- D. Temperature Limitations:
 1. Apply when surface and air temperature are between 40 and 90 degrees Fahrenheit unless otherwise indicated by manufacturer's written instructions.
 2. Apply when surface and air temperatures are expected to remain above 40 degrees Fahrenheit for a minimum of 8 hours after application unless otherwise indicated by manufacturer's written instructions.
- E. Apply when air conditions are calm to minimize surface treatment contacting surface not intended to be finished.
- F. Do not apply to frozen substrate. Allow adequate time for substrate to thaw if freezing conditions exist before application.
- G. Apply a minimum of 24 hours after rain event. Suspend application when rain is anticipated for a period of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.
- H. Temporary Heat: Ambient temperature of 50 degrees Fahrenheit minimum.

- I. Ventilation: Provide adequate ventilation in confined or enclosed areas in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Substitutions: In accordance with Section 01 25 0 – Substitution Procedures.

2.02 MATERIALS

- A. Penetrating Concrete Hardener/Densifier: Lithium silicate hardener/densifier.
 1. Product: Consolideck LS, manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, www.prosoco.com.
 2. Subject to compliance with the following requirements:
 - a. Comply with national, state and district AIM VOC regulations and contain 50 g/L or less.
 - b. Registered as an approved NSF International/Nonfood Compound Registration.
 - c. Abrasion Resistance: Greater than 50 percent improvement over untreated samples when tested in accordance with ASTM C1353.
 - d. Achieve 'High Traction Range' readings when tested in accordance with ANSI B101.1 and ANSI B101.3.
 - e. Adhesion: Greater than 10 percent increase in pull-off strength when compared to an untreated sample when tested in accordance with ASTM D4541.
 - f. Water Vapor Transmission: 100 percent retained when compared to untreated samples when tested in accordance with ASTM E96/96M Method B (Water Method).
 - g. UV Stability: No degradation or yellowing of material when tested in accordance with ASTM G154.
- B. Interior Concrete Protective Treatments:
 1. General Purpose semi-gloss film forming premium sealer, lithium silicate hardener/densifier.
 - a. Product: Consolideck LSGuard, manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, www.prosoco.com.
 - b. Subject to compliance with the following requirements:
 - i. Comply with national, state and district AIM VOC regulations.
 - ii. Registered as an approved NSF International/Nonfood Compound Registration.
 - iii. Achieve 'High Traction Range' readings when tested in accordance with ANSI B101.1 and ANSI B101.3.
 - iv. Adhesion: Greater than 10 percent increase in pull-off strength when compared to an untreated sample when tested in accordance with ASTM D4541.
 - v. Stain Resistance: Achieve limited or no adverse effects when tested in accordance with ASTM D1308
 - vi. UV Stability: No degradation or yellowing of material when tested in accordance with ASTM G154.

2.03 EQUIPMENT

- A. Conform to ACI 310.1 Part 2.2, except where more stringent requirements are specified below.
- B. Auto Scrubber Machine: For cleaning operations.
- C. Hand Grinder or stand-up edger for edge grinding/polishing.
- D. Grinding/Polishing Equipment:
 - 1. Dry grinding/polishing machines shall include a dust extraction system, including HEPA filtration vacuum.
- E. Diamond Segments:
 - 1. Use heads from the same manufacturers throughout the entirety of the project.
- F. Diamond Heads Types:
 - 1. Metal Diamonds: 80 or 150.
 - 2. Hybrid Style Diamonds: 50 or 100.
 - 3. Resin Bonded, Phenolic Diamonds: 100, 200, 400, and 800.
- G. Burnishing Machine and Burnishing Pads to produce specified results.
 - 1. Burnishing Machine: High speed burnisher, generating pad speeds of 1,500 RPM or higher, as recommended by protective treatment manufacturer. Dust skirt must be installed at time of work.
 - 2. Burnishing Pads: as recommended by protective treatment manufacturer.
 - a. White Burnishing Pad, non-abrasive.
 - b. Consolideck Heat Pad manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, www.prosoco.com.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrate with installer present for conditions affecting performance of finish. Correct conditions detrimental to timely and proper work. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work.
- B. Do not begin installation until all unsatisfactory conditions are resolved. Beginning work constitutes acceptance of site conditions and responsibility for defective installation caused by prior observable conditions.

3.02 PREPARATION

- A. Clean dirt, dust, oil, grease and other contaminants that interfere with penetration or performance of specified product from surfaces. Use appropriate concrete cleaners approved by the concrete surface treatment manufacturer where necessary. Rinse

thoroughly using pressure water spray to remove cleaner residues. Allow surfaces to dry completely before application of product.

- B. Repair, patch and fill cracks, voids, defects and damaged areas in surface as approved by the Architect. Allow repair materials to cure completely before application of product.
- C. Variations in substrate texture and color will affect final appearance and should be corrected prior to application of sealer/hardener system and the polishing steps.
- D. Protect surrounding areas prior to application. If product is accidentally misapplied to adjacent surfaces, flush with water immediately before material dries.
- E. Avoid contact in areas not to be treated. Avoid contact with metal, glass and painted surfaces.
- F. Seal open joints in accordance with Section 07 90 0.
- G. Apply specified sealants and caulking and allow complete curing before application of penetrating concrete hardener/densifier.
- H. Do not proceed until unsatisfactory conditions have been corrected.

3.03 CONCRETE GRINDING, HONING, AND POLISHING

- A. Adhere to industry standard and conform to ACI 310.1 for grinding, honing, and polishing procedures for dry and wet grinding and honing, except where more stringent requirements are specified below.
- B. Scrub and rinse slab surface with clean water and vacuum with auto-scrubber between and after final passes.
- C. Sequential progression of diamond tooling steps shall be required and limited to no more than double the grit value of the previous diamonds used.
- D. Overlap adjacent passes by 25 percent.
- E. Perform each pass perpendicular to the other pass north/south then east/west; multiple passes may be needed.
- F. Progressively grind, hone and polish the slab surface utilizing approved diamond segments as necessary to produce Finishing requirements.

3.04 APPLICATION OF PENETRATING CONCRETE HARDENER/DENSIFIER

- A. Apply hardener/densifier at the rate of 500 to 700 square feet per gallon with a low pressure sprayer fitted with a 0.5 gpm spray tip. (Typically after 200-grit and no later than 400 grit).
- B. Apply sufficient material to keep concrete surface wet for 5 to 10 minute period, without producing puddles.
- C. Allow treated surface to dry.
- D. Continue progressively polishing floor with required resin diamonds as necessary to produce desired final finish.

3.05 APPLICATION OF INTERIOR CONCRETE PROTECTIVE TREATMENT

- A. Application of general purpose, semi-gloss protective treatment:
 - 1. Apply per manufacturer's published recommendations to clean, dry slab at the completion of mechanically polishing the slab surface.
 - 2. Lightly wet a clean microfiber pad with protective treatment and wring out excess, leaving the pad damp.
 - 3. Working from one control joint to another, apply a light, fine spray of protective treatment to a small section of the floor using a clean, pump-up sprayer fitted with a 0.5 gpm spray tip, at an estimated coverage rate of 2000 to 3000 square feet per gallon.
 - 4. Using the damp microfiber pad and firm downward pressure, immediately spread the protective treatment to produce a thin, even coating. Spread the product as far as possible while maintaining a wet edge. Properly applied, protective treatment dries quickly. Stop spreading once drying begins. Avoid overlapping.
 - 5. Allow to dry tack free, typically 20 to 60 minutes.
 - 6. Once dry, high- speed burnish slab surface fitted with manufacturer recommended burnishing pad to increase gloss and to help the treatment fuse and bond with the concrete for increased durability and longevity. Surface temperatures immediately behind the burnisher must achieve 90.5 degrees Fahrenheit. (Burnish between coats if multiple applications are desired.)
 - 7. Repeat above steps 1 through 6, as necessary for additional applications of protective treatment, to achieve desired final finish (Maximum 3 coats).

3.06 SLAB PROTECTION

- A. Comply with provisions of ACI 310.1 specification for slab protection, except where more stringent requirements are specified below.
- B. Protect finished floors to prevent damage including staining, gouges and scratching by construction traffic and activities until possession.
- C. Do not drag or drop equipment or material across the slab which will scratch or chip it.

- D. Inspect tires for debris prior to use on slab. Remove embedded items which may cause damage to floor slab.
- E. Clean up spills on slab immediately. Provide cleaning chemicals and absorptive materials.
- F. Develop a concrete protection procedure which addresses the following procedures:
 - 1. Communication of protection plan to subcontractors and vendors.
 - 2. Procedures for cleaning up slab spills, including use of and availability of cleaning chemicals and absorptive materials at Site.
- G. Provide a clean slab surface using concrete maintenance cleaner within an auto scrubber, equipped with soft nylon brushes, in accordance with manufacturer's published recommendations.

3.07 FINISHING REQUIREMENTS

- A. Appearance:
 - 1. Interior exposed finished slab areas must consist of the following:
 - a. Slab surface must meet the desired sheen, as discussed in Pre-Installation meeting and be consistent with approved Mock-up.
 - b. Slab surface must have a consistent look and exhibit a finish that has no evidence of streaking or burnish marks.
 - c. White residue or hazy appearance is not acceptable.
 - d. Exposure of aggregate ACI 310.1 Table 3.2.3.1, Aggregate Exposure Class B-Fine Aggregate.
 - 2. Interior exposed finished slab areas must consist of the following CPAA Gloss Level:
 - a. Interior exposed finished slab areas must meet the ACI 310.1 Table 3.2.4.1-Appearance levels for distinctness of image (DOI) Level 2.

END OF SECTION

SECTION 04200 - UNIT MASONRY

PART 1 - GENERAL

- A. This Section includes all labor, materials, equipment, and related items required for the work of unit masonry as shown on the Drawings and as specified.

PART 2 - PRODUCT HANDLING

- A. Store all masonry units on screeds and under cover to properly protect from the elements until ready for use. Dirty, cracked, chipped, or otherwise damaged masonry units shall not be used.

PART 3 - ENVIRONMENTAL CONDITIONS

- A. Masonry shall not be laid in freezing weather unless suitable means are used to heat the materials and protect the work from cold and frost, and to ensure that the mortar will properly harden without freezing.

PART 4 - PROTECTION

- A. The Contractor shall protect exposed masonry materials of every kind against staining, and the tops of all walls shall be kept covered with non-staining waterproof covering at the end of each work day and at any time the work thereon is not in progress. When starting or resuming work at a new level, the top surface of the work in place shall be cleaned of all loose mortar and foreign materials and in drying weather thoroughly wetted with clean water. Then resume laying.

PART 5 - MATERIALS

- A. Masonry Units:

1. Calcium Silicate Building Stone Units: to ASTM C73, Grade SW; solid units that have been pressure formed and autoclaved; special shapes as indicated; three-size configuration; as follows:

Modular Sizes:

OC22: 2-1/4" high x 23-5/8" long x 3-13/16" deep

OC35: 3-5/8" high x random long x 3-13/16" deep

OC47: 4-7/8" high x random long x 3-13/16" deep

2. Texture: rugged chiseled finish on exposed faces.

Provide all special matching units for applications were indicated by the details or required, including sill units. Units shall conform to details and dimensions shown on the Drawings and finished surfaces shall be indistinguishable from those of building stone units specified above.

B. Masonry Wall Reinforcement:

1. Provide all prefabricated internal or external corners required by installation.
- C. Anchors and ties shall be of corrosion resistant metal equal in strength, size and numbers to conform with requirements of American standard A41.1 titled American Standard Building Code Requirements for Masonry.**
1. Brick wall ties. crimped wall ties for anchorage of masonry to backing in metal stud frame shall be crimped galvanized metal 22 gauge, 7/8" wide x 7" long.

PART 6 - LAYING MASONRY

- A. Examination:** Verify site conditions are ready to receive work. Inspect materials for fit and finish prior to installation. Do not set unacceptable units. Beginning of installation means acceptance of existing conditions.
- B. Cutting Masonry Units:** Cut masonry units to length with a masonry splitter. Dress split end to match face when exposed in wall.
- C. Wetting Masonry Units:** Where the ambient air temperature exceeds 100°F or exceeds 90°F with a wind velocity greater than 8 mph, pre-wet building stone units. Lay wetted units when surface dry.
- D. Coursing:** Place masonry to lines and levels indicated. Lay building stone units in random bond pattern, to the following percentage ratio, described from smallest to largest sized units: [40:40:20]. Maintain mortar joint thickness of 3/8 inch.
- E. Placing and Bonding:** Lay masonry in full bed of mortar, properly jointed with other work. Buttering corners of joints, deep or excessive furrowing of mortar joints are not permitted. Fully bond intersections, and external corners. Do not adjust masonry units after laying. Where resetting of masonry is required, remove, clean units and reset in new mortar.
- F. Control Joints.** Provide continuous 3/8" wide vertical control joints in exterior face brick were indicated by cutting half-brick closures in alternate courses, omitting mortar continuously in the joint. Control joints shall fall at normal head joint locations and shall be absolutely plumb so as to be inconspicuous in the finish work. Caulking of control joints is specified under Section 07900.
- G. Weeps.** Provide weep holes in exterior brick wall surfaces in all joints containing through wall membrane flashing at spacing shown on the Drawings. Weeps shall be made by laying 3/8" cotton cords at required locations. Cords shall be treated for withdrawal from joints cleanly after mortar has set.
- H. Workmanship.** The Contractor is cautioned that the Architect will demand first class workmanship. All masonry shall be performed by experienced masons. Any chipped, cracked, or otherwise damaged or defective work will be rejected.

PART 7 - THROUGH-WALL MEMBRANE FLASHING

- A. Install plastic through-wall membrane flashing continuously in horizontal joints of exterior walls, at window openings, etc. were shown on the Drawings. Installation shall be in strict accordance with manufacturer's printed instruction. Flashings shall extend generally from within 1/2" of exterior wall face through the wall as detailed.
- B. Where laps occur, lap sheets at least 6" and seal with cold setting cement. Roll to insure full adhesion.
- C. At obstructions, carry flashing up 6" and secure with cold setting cement.
- D. Where ties or anchors, conduit, etc. penetrate through sheet, punctures shall be made minimum size possible and mastic troweled around place to thoroughly seal the puncture.
- E. At lintels and shelf angles, flashings shall extend minimum of 6" beyond ends of lintels.

PART 8 – ADJUSTING AND CLEANING

- A. Clean as directed below and leave for one week. If no harmful effects appear, all objectionable stains removed and after mortar has set and cured, clean masonry as follows:
 - .1 Protect windows, sills, doors, trim and other work from damage.
 - .2 Remove large particles with stiff fiber brushes without damaging surface.
 - .3 Saturate masonry with clean water and flush off loose mortar and dirt.
 - .4 Dilute cleaning agent with clean water in controlled proportions.
 - .5 Apply solution to pre-soaked wall surface using soft-bristled brush.
 - .6 Thoroughly rinse cleaning solution and residue from wall surface.
- B. Use alternative cleaning solutions and methods for difficult to clean masonry only after consultation with masonry unit manufacturer.
- C. Protect units from damage resulting from subsequent construction operations. Use protection materials and methods which will not stain or damage units. Remove protection materials upon Substantial Performance of the Work, or when risk of damage is no longer present.

End of Section

SECTION 05400 - LIGHT GAUGE METAL FRAMINGS

PART 1 - SCOPE

- A. Work under this section includes light gage steel studs, framing members, joist, purling's and related accessories as indicated on Drawings and specified herein.

1.01 STANDARDS:

- A. Work shall meet the requirements of the following standards.
 - 1. American Iron and Steel Institute (A.I.S.I.) Design of Cold Formed Steel Structural Members, 1980
 - 2. American Welding Society (A.W.S.) D.1.3., 1981 Structural Welding Code - Sheet Steel.
 - 3. American Society for Testing and Materials (A.S.T.M.)
 - 4. American Institute of Steel Construction (A.I.S.C.) Manual of Steel Construction, 8th Edition.
 - 5. All pertinent Federal, State and local codes.
- B. The most stringent requirements shall govern in conflicts between specified codes and standards.

1.02 SUBMITTALS:

- A. Prior to framing fabrication, submit formal fabrication and erect shop drawings for Architect's approval.
- B. Shop Drawings shall indicate:
 - 1. All member gages, spacings and sizes.
 - 2. Shop and field assembly details including cut and connections.
 - 3. Type and location of welds, bolts and fastening devices.

PART 2 - MATERIALS

- A. All studs and/or joists and accessories shall be of the type, size, gauge and spacing shown on the drawings, and shall be manufactured by United States Gypsum Company, Milcor Division of Inryco, Inc. or equal.

- B. All structural members shall be designed in accordance with American Iron and Steel Institute (AISI) "Specification for the Design of Cold-Formed Steel Structural Members," edition.
- C. All framing members shall be formed from corrosion-resistant steel, corresponding to the requirements of ASTM A446, with a minimum yield strength of 40 ksi for SJ and CS-style studs, 33 ksi for CR-runners.
- D. Fabrication:
 - 1. Framing components may be preassembled into panels prior to erecting. Prefabricated panels shall be square, with components attached in a manner as to prevent racking. Members shall be held positively in place until properly fastened.
- E. Prefabricated panels shall be square with components attached in a manner as to prevent racking and to minimize distortion while lifting.
- F. All framing components shall be cut squarely for attachment to perpendicular members, or, as required for an angular fit against abutting members.
- G. Axially loaded studs shall be installed in a manner which will assure that their ends are positioned against the inside of runner web prior to fastening.
- H. Insulation equal to that specified elsewhere shall be provided in all doubled jamb studs and doubled headers not accessible to insulation contractors.
- I. Fastening of components shall be with self-drilling screws or welding. Screws shall be of sufficient size to insure the strength of the connection. Wire tying of components shall not be permitted. All welds shall be touched up with a zinc-rich paint.

PART 3 - EXECUTION

- A. Inspection shall be for proper size to ensure members are not bent or in poor condition.
- B. Product Handling:
 - 1. Upon delivery, material shall be protected from rain and snow by impervious covering or shelter.
- C. Trusses shall be securely anchored to the supporting structure as shown on the drawings.

END OF SECTION

SECTION 05500 - MISCELLANEOUS METALS

PART 1 - SCOPE

- A. This Section includes the furnishing and installation of all miscellaneous metal items required for the project as shown on the Drawings and specified herein.

PART 2 - COORDINATION

- A. Coordinate furnishing of items specified hereunder with work of other trades so that progress of related work is not delayed.
- B. Take field measurements at the job as necessary to insure fit.

PART 3 - MATERIALS

- A. Stock or manufacturer's standard items shall be as described under individual item specifications hereunder.
- B. Fabricated items, made especially for this project, shall meet general materials specifications as listed hereunder. Materials shall be of the type, class, temper, etc., which best suit intended uses.
 - 1. Steel shall conform to ASTM Specification A-7 or A-36 for structural steel. Architectural and miscellaneous steel not otherwise indicated or specified shall be mild steel.

Shop Drawings and Data: Show complete details and instructions for fabrication, assembly, and installation. Locate anchor bolts required for installation in other work.

Inserts and Anchorages: Furnish inserts and anchoring devices to be built into other work for installation of miscellaneous metal items.

Steel Plates, Shapes, Bars: ASTM A 36

Tubular Steel Items: Square and rectangular, ASTM A 501; pipe, ASTM A 120.

Cold-Rolled Steel Sheets: ASTM A 366.

Galvanized Steel Sheets: ASTM A 526, with ASTM A 525 G90 zinc coating.

Concrete Inserts: Malleable iron (ASTM A 47) or cast steel (ASTM A 27) inserts, with steel bolts, washers and shims; hot dip galvanized.

Shop Paint: FS TT-P-86, Type 2; or, SSPC-Paint 14. Apply to prepared steel surfaces at rate to provide a 2.0-mil dry film thickness.

Galvanizing: ASTM A 386 for assembled products; A 153 for iron and steel hardware.

Fabrication, General: Use materials of size and thickness shown. Shop-paint all items not specified to be galvanized after fabrication.

Curb Edge Bars: Fabricate of shapes as shown; miter corners and weld joints. Provide anchors 6" from ends of corners and 24" o.c.

Loose Bearing Plates: Provide for steel items bearing on masonry or concrete, as shown. Drill plates to receive anchor bolts.

Miscellaneous Framing and Supports: Provide as required to complete work and not included with structural steel framework.

Steel Pipe Railings: Fabricate to dimensions shown, with smooth bends and welded joints. Use 1-1/2" steel pipe unless otherwise shown.

Installation: Perform cutting, drilling, and fitting required for installation; set work accurately in location, alignment and elevation, measured from established lines and levels. Provide anchorage devices and fasteners where necessary for installation to other work.

PART 4 - SHOP PAINTING AND PROTECTIVE COATING

- A. All ferrous metal shall be properly cleaned and given one shop coat of red lead, zinc chromate, or other approved rust resisting paint. Anchors that are built into masonry or concrete shall be coated with asphalt paint unless specified to be galvanized. Where galvanized or zinc coated metal is required, it shall not be shop primed unless specifically called for, but all abraded places and welding shall be touched up with aluminum paint. No prime coat is required for non-ferrous metal.
- B. Where hot-dip galvanized or hot zinc coating is specified, it shall be done in accordance with the Standard Specifications of the American Hot Dip Galvanizers Association.

PART 5 - FASTENINGS

- A. Welding. Perform all welding in accordance with American Welding Society publication AWS D1.0, latest edition with current supplements and addenda.
 - 1. Welds shall be made only by operators experienced in performing the type work indicated.
 - 2. Welds normally exposed to view in the finished work shall be uniformly made and ground smooth.

3. Where welding is done in proximity to glass or finished surfaces, such surfaces shall be protected from damage due to weld sparks or spatter.
- B. Bolted Screwed, and Riveted Connections. In general, use bolts for field connections only as directed. Provide washers under all heads and nuts bearing on wood. Draw all nuts tight and nick threads of permanent connections to prevent loosening. Use beveled washers where bearing is on sloped surfaces.
1. Where screws must be used for permanent connection in ferrous metal, use flat head type, countersunk.
 2. Where rivets are used, they shall be machine driven, tight, heads centered, countersunk and finished flush and smooth.

PART 6 - MISCELLANEOUS ITEMS

- A. Anchoring Devices. Furnish all miscellaneous metal anchoring devices required to be built into concrete or masonry or welded to steel framing members for anchorage of collateral work which are not specified to be furnished under other sections of the Specifications. Items include, but are not necessarily limited to the following:
1. Anchor bolts for miscellaneous anchorage built into concrete or masonry not furnished under work of structural steel shall be hex-head steel machine bolts of sizes shown in the details, shall conform to ASTM A354, and shall be furnished with nuts and plate washers of size to suit the particular application.
- B. Loose Lintels. Furnish all loose steel angle and/or plat lintels not furnished as part of structural steel under work of Section 05120 as required for support of masonry over openings. Members shall be of sizes shown, and, unless otherwise indicated, shall have minimum bearing at each end of 8".

End of Section

SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.01 Related Documents

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.02 Description of Work

- A. Definition: Rough carpentry includes carpentry work not specified as part of other sections and which is generally not exposed, except as otherwise indicated.
- B. Types of Work in this Section include rough carpentry for:
 - 1. Wood grounds, nailers and blocking.
 - 2. Wood furring.
 - 3. Plywood backing panels.
- C. Architectural woodwork is specified in another section within Division 6.
- D. Comply with provisions of Section 01028 - Modification Requirements.

1.03 Submittals

- A. Wood Treatment Data: Submit chemical treatment manufacturer's instructions for handling, storing, installation and finishing of treated material.
 - 1. Preservative Treatment: For each type specified, include certification by treating plant stating type of preservative retained and conformance with applicable standards.
 - 2. For water-borne treatment, include statement that moisture content of treated materials was reduced to levels indicated prior to shipment to project site.
 - 3. Fire-Retardant Treatment: Include certification by treating plant that treatment material complies with specified standard and other requirements.

1.04 Product Handling

- A. Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels; provide for air circulation within and around stacks and under temporary coverings including black polyethylene and similar material.
 - 1. For lumber and plywood pressure treated with waterborne chemicals, sticker between each course to provide air circulation.

1.05 Project Conditions

- A. Coordination: Fit carpentry work to other work, scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds and similar supports to allow attachment of other work.

PART 2 - PRODUCTS

2.01 Lumber General

- A. Lumber standards: Manufacture lumber to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.
- B. Inspection Agencies: Inspection agencies and the abbreviations used to reference with lumber grades and species include the following:
 - 1. NLGA - National Lumber Grades Authority
 - 2. SPIB - Southern Pine Inspection Bureau
 - 3. WGLIB - West Coast Lumber Inspection Bureau
 - 4. WWPA - Western Wood Products Association
- C. Grade Stamps: Factory - mark each piece of lumber with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
- D. Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for moisture content specified for each use.
 - 1. Provide dressed lumber, S4S, unless otherwise indicated.
 - 2. Provide seasoned lumber with 19% maximum moisture content at time of dressing and shipment for sizes 2" or less in nominal thickness, unless otherwise indicated.

2.02 Dimension Lumber

- A. Provide wood for support or attachment of other work including bucks, nailers, blocking, furring, grounds, stripping and similar members. Provide lumber of sizes indicated, worked into shapes shown, and as follows:
 - 1. Moisture content: 19% maximum for lumber items not specified to receive wood preservative treatment.
- B. Grade: Standard Grade light framing size lumber of Spruce-Pine-Fir graded under WWPA, or Southern Pine graded under S.P.B. rules.

2.03 Plywood

- A. Trademark: Factory-mark each construction panel with APA trademark evidencing compliance with grade requirements.
- B. Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant treated plywood panels with grade designation, APA C-D PLUGGED INT with exterior glue, in thickness indicated, or, if not otherwise indicated, not less than $\frac{3}{4}$ ".

2.04 Miscellaneous

- A. Fasteners and Anchorages: Provide size, type, material, and finish as indicated and as recommended by applicable standards, complying with applicable Federal Specifications for nails, screws, bolts, nuts, washers, and anchoring devices. Provide metal hangers and framing anchors of the size and type recommended by the manufacturer for each use including recommend nails. Supplement fasteners for fascia framing with Simpson or Teco galvanized metal connectors as required.
 - 1. Where rough carpentry work is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners and anchorages with a hot-dip zinc coating (ASTM A153).
- B. Building Paper: ASTM D226, Type I; asphalt saturated felt, non-perforated, 15 lb. type.

2.05 Wood Treatment by Pressure Process

- A. Preservative Treatment: Where lumber or plywood is indicated as "Trt-Wd" or "Treated," or is specified herein to be treated, comply with applicable requirements of AWPB Standards C2 (Lumber and C9 Plywood) and of AWPB Standards listed below. Mark each treated item with the AWPB Quality Mark Requirements.
- B. Complete fabrication of treated items, prior to treatment, where possible. If cut after treatment, coat cut surfaces with heavy brush coat of same chemical used for treatment and to comply with AWPB M4. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.
- C. Fire-Retardant Treatment: Where fire retardant treated wood ("FRTW") is indicated, pressure impregnate lumber and plywood with fire-retardant chemicals to comply with AWPB C20 and C27, respectively, for treatment type indicated below; identify "FRTW" lumber with appropriate classification marking of Underwriters Laboratories, Inc., U.S. Testing, Timber Products Inspection or other testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Provide a 4' x 4' sheet for phone/data equipment.

PART 3 - EXECUTION

3.01 Installation, General

- A. Discard units of material with defects which might impair quality of work, and units which are too small to use in fabricating work with minimum joints or optimum joint arrangement.
- B. Set carpentry work to required levels and lines, with members plumb and true and accurately cut and fitted.
- C. Securely attach carpentry work to substrate by anchoring and fastening as shown and as required by recognized standards.
- D. Use common wire nails, except as otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; predrill as required.

3.02 Wood Grounds, Nailers, and Blocking

- A. Provide wherever shown and where required for screening or attachment of other work. Form to shapes as shown and cut as required for true and level of work to be attached. Coordinate location with other work involved.
- B. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise shown. Build into masonry during installation of masonry work. Where possible, anchor to form work before concrete placement.

3.03 Plywood Panels

- A. General: Comply with applicable recommendations contained in Form No. E 30D "APA Design/Construction Guide - Residential & Commercial," for types of construction panels and applications indicated.

END OF SECTION

SECTION 06400 - PLASTIC LAMINATE CASEWORK AND COUNTERTOP'S

PART 1 - DESCRIPTION

- A. Furnish and install plastic laminate casework and countertops as shown on the drawings and specified herein.
- B. Work included:
 - 1. Casework - plastic laminate faced.
 - 2. Plastic laminate covered countertops for wood and laminate casework.
 - 3. Plastic laminate covered shelves.
 - 4. Standard hardware and accessories.
 - 5. Plastic laminate window stools throughout building at exterior windows as detailed.
- C. Related work specified elsewhere:
 - 1. Rough carpentry: Section 6100
 - 2. Finish carpentry: Section 6200
 - 3. Gypsum Drywall: Section 9250
 - 4. Resilient base: Section 9650
 - 5. Mechanical work: Division 15
 - 6. Electrical work: Division 16
 - 7. Metal casework: Section 11600

PART 2 - QUALITY ASSURANCE

- A. Custom plastic laminate faced casework shall match in design, material, finish and detail the stock plastic laminated casework. The materials, workmanship and installation of all casework provided under this section shall be the responsibility of this contractor.
 - 1. The contractor providing the work described herein, may be a custom casework contractor with a casework manufacturer as a subcontractor/supplier; or a stock casework with a custom casework manufacturer as a subcontractor/supplier.
- B. Any casework manufacturers requesting approval shall provide to architect, all information and specifications of the products they wish to use in bidding, ten days prior to bid date. Approval will be contingent upon whether the products meet the required specifications.
- C. The architect reserves the right to disapprove any subcontracting fabricator proposed for this project. The casework contractor shall submit to the architect, prior to fabrication, a letter signed by a responsible officer of the fabricator indicating satisfactory evidence of having completed comparable work for the past five years on similar projects utilizing equipment, methods and workmanship meeting the standards specified in this section.
- D. If requested by the architect, manufacturers requesting approval shall submit full size production line samples of the following units at least ten days prior to bid opening.
 - 1. One cabinet base unit, 36" wide with door and drawer, complete with laminate top to fit.

E. Reference standards:

1. Architectural Woodworking Institute (AWI) "Quality Standards".
2. National Electrical Manufacturers Association (NEMA) "LD 1 thru LD3" High Pressure Decorative Laminates.
3. Federal Specifications (FS) "LLL-H-00810: Building Board (Hardboard), Hard Pressed, Vegetable Fiber".
4. American National Standard (ANSI) A208.1-79 "Mat-Formed Wood Particleboard".
5. Commercial Standards (CS) "C.S. 35: Adhesives".

PART 3 - SUBMITTALS

- A. Certifications: Letter of subcontractor's qualifications and experience within the past five years and references of work completed.
- B. Color Selection: Complete range of color, textures and patterns of the proposed plastic laminate manufacturer, based upon the preliminary color selections listed hereinafter, with architect's approval. Final approval shall be contingent upon providing colors, textures and patterns matching preliminary selections.
- C. Shop Drawings: Submit shop drawings of items specified herein. Indicate: plan views, elevations, sections and details of each item; location in the building of each item; conditions in relation to adjacent materials and construction; methods of assembling sections; location and installation requirement size(s); shape and thickness of materials, joints and notations of special features; sink locations; and drawings required to illustrate deviations from the contract requirements.
- D. Rough in drawings: submit separate utility rough in drawings which indicate points of connection to each utility involved. Reference dimensions from building components.

PART 4 - PRODUCTS DELIVERY, HANDLING AND STORAGE

- A. Schedule casework for fabrication and delivery to avoid delay in work progress. Delivery to job site shall not be earlier than one month before casework can be installed. Verify delivery date with general trades contractor.
- B. Receive, unload, check, store, protect and distribute materials specified in this section.
- C. Store materials to maintain the moisture content of the wood members between 6% and 15%. Store in areas or rooms with temperatures at 70°F ± 10°F.
- D. Store under cover in a ventilated building not exposed to extreme temperature and humidity changes. Do not store or install casework until concrete, masonry and plaster work is dry.

PART 5 - JOB CONDITIONS

- A. Prior to fabrications of items of casework which are dependent upon building dimensions, take accurate field measurements of location of walls, drop soffits, columns, piers and other applicable building elements. Major discrepancies between dimensions given on the drawings and field dimensions shall be brought to the attention of the general trade's contractor. Compensate for minor dimensional changes so that fabricated items can be delivered to the job, and can be scribed to fit properly.

- B. In no instance shall any casework be stored or installed in any area unless the area is broom clean, closed in and possessing a relative humidity below 50% at 70°F.

PART 6 - WARRANTY

- A. Warranty in writing that defects due to use of improper materials or workmanship in casework provided under this contract for the period of one year from the date of substantial completion of the work, shall be rectified promptly by the casework contractor at his own expense upon notification of condition.

PART 7 - GENERAL

- A. Casework, both stock and custom shall be plastic laminate construction consisting of high-pressure decorative laminate bonded to 3/4" thick particle board.
 - 1. Fabrication shall comply with applicable requirements for "Custom grade" as indicated in Section 400 of the AWI architectural woodwork quality standards and guide specifications.
- B. Cabinet units shall be assembled at the mill, insofar as access openings to installation location will permit. Where items must be built into sections, design the units so they can be assembled at the site into one integral item, with exposed joints flush, tight and uniform. Similar adjoining doors and drawers shall be in alignment and each door and drawer shall operate smoothly, without bind or excessive play.
- C. Casework units shall be complete with bases, shelves, counter and work tops, finish and operating hardware, drawer accessories and miscellaneous accessories as indicated on the drawings and specified herein.
- D. Coordination work:
 - 1. Division 9: Provide physical openings for recessed casework.
 - 2. Section 6100: Provide grounds and blocking necessary for attachment and support of wall mounted casework.
 - 3. Plumbing Prime Contractor: provide lay-in sinks, faucets and fittings; templates for cutouts for installation; provide supply and waste lines including traps to rough in points based on information supplied by the casework contractor; and provide final connections.
 - a. Division 15: Provide stainless steel sinks with integral with tops and backsplashes, include tailpieces, drains and strainers.
 - 4. Electrical prime contractor: provide electrical fixtures and equipment noted on drawings including related boxes, conduit and conductors. Provide electrical components complete, terminating through the back of the casework unit either with a junction box or a 2" conduit stub. Allow conductors to protrude 8" to permit final connection by Division 16.

5. Division 16: Locate rough-ins based on information given on casework rough-in drawings and be responsible for work necessary to make final connections.
6. Division 9650: Apply resilient base to casework after casework has been installed.
7. Division 5500: Provide steel support braces.

E. Definitions shall conform to the following:

1. Exposed portions are those visible from a normal point of view when doors and drawers are closed. Interiors of open cabinets, and open shelving are considered exposed.
2. Semi-exposed portions are those areas not considered exposed, but which are visible from a normal point of view when solid doors and drawers are open. Backs of hinged doors, drawer parts except the exposed exterior front, and shelving in the storage areas are considered semi exposed.
3. Concealed portions include sleepers, web frames, dust panels and other surfaces not visible after installation.

PART 8 - MATERIALS

A. Particle board: 45 lbs. Minimum density and of balance construction, with moisture content less than 8%. Particle board shall conform to ANSI A208.1 and meet or exceed CS-236-66, FS LLL-B-800A and ASTM D1037-78.

1. Surfaces shall be smooth with all chips, shavings or flakes well scoured so that there shall be no visible telegraphing of the core face through the plastic laminate.
2. Square and rectangular cutouts shall have radiused corners not less than ½".
3. At cut edges, exposed or not and where cutouts occur, the edges shall be completely sealed to prevent moisture absorption. Cutouts for pipes shall be round.
4. Meet the following performance requirements: Submit compliance data from the manufacturer prior to fabrication.
 - a. Screw holding face: 371 lbs.
 - b. Modulus of rupture: 2400 psi
 - c. Modulus of elasticity: 450,000 psi
 - d. Internal bond: 90 psi
 - e. Surface hardware: 90 psi

B. Edging: Flat edge design for cabinet body in color matched laminate or PVC. Color as selected by architect.

C. Plastic Laminate: High pressure decorative laminate surfacing material meeting the minimum NEMA Standards for abrasion resistance, heat resistance, stain resistance, moisture resistance, dimensional stability and general rules for fabrication and installation.

1. Plastic laminate materials shall be as selected by the Architect from full product line of national manufacturers such as Formica, Wilsonart, Pionite, Nevamar, Arborite, or an approved equal.
2. Exposed horizontal work surfaces: NEMA GP50, PF (Post-forming) satin surface.
3. Exposed vertical work surfaces: NEMA GP 28 laminate.
4. Semi exposed surfaces: 10 mil polyester laminate in conformance to ASTM D1300, factory bonded at 200 psi at 300°F, minimum. Color shall be manufacturers white.
5. Backing sheet: NEMA BK20 and shall be used where laminate covered work is not restrained from warping or twisting by the method of attachment or by supports. Minimum standard of AWI Custom work shall apply.
6. Bonding adhesive: Water resistant type and as recommended by the approved plastic laminate manufacturer. Plastic laminate shall be applied to the core in the shop, using commercial methods, application and presses.
7. Sealant used for sealing particle board or plywood edges shall be HYBOND 80 by Pierce Stevens Corporation, Safecoat Seal by Dwell Smart, or an approved equal

D. Assembly adhesives used in assembly, installation and other applications, shall be one of the following or an approved equal:

1. HYBOND 80
2. HYBOND WHITE
3. CANPLAST 100

E. Provide hardware as follows: This is not intended to be a complete listing, but as a guide to establish quality:

1. Hinges shall be cast steel cup and hinge concealed hinges #75M5550 by BLUM
 - a. Hinges shall have independent three-way adjustment of doors.
 - b. One pair of hinges per door of 30" or less, one- and one-half pair of hinges per door of 48" and one hinge for every 12" of door over 48".

- c. Each hinge shall be removable by means of a clip mechanism lever attached to the hinge.
 - d. Hinges shall be mounted into corresponding hinge plates.
 - e. Hinges shall have 125 ° free movement of swing and be self-closing within two inches of close.
 - f. Hinges shall have a lifetime warranty against defects from workmanship and materials.
 - g. Hinges shall be installed into door panels by means of a pre-drilled hole and press fitted into panel substrate.
- 2. Pulls for all doors and drawer fronts shall be manufacturers standard bent wire pull, brushed chrome finish, three-inch centers. Nomenclature for this ABP865-26D by AMEROCK, Yale Locks, or an approved equal.
 - 3. Drawer slides shall be side mounted, bottom supported, 4-point suspension slides with nylon roller bearing and epoxy coating.
 - 4. All file drawers shall have either Pendaflex, Decor, file followers, or an approved equal.
 - 5. All shelf clips shall be BLUM nylon covered steel pin (5mm) that will mount into pre-drilled end panels for a support of at least 250 lbs; Yale, or an approved equal.
 - 6. Locks, noted on drawings, shall be cam tumbler by NATIONAL LOCK, Yale, or an approved equal.
 - 7. Clothes rods and mounting flanges shall be Knape-Voght #770 and #734, Hardware Decor, or an approved equal.
 - 8. Optional sliding doors are mounted on steel tracks and use ball bearing sheaves mounted in the doors.
 - 9. Grommets shall be spring loaded closure type in assorted sizes.

PART 9 - CONSTRUCTION

- A. All cabinets shall be of 3/4" thick MCP by Domtar, 3/4" thick solid wood by Wellborn or an approved equal, finished ends and dowel pinned to tops, bottoms or backs, shall be laminated with plastic laminate and edged with matching PVC.

1. End panels shall consist of a single panel of MCP drilled and dowel pinned to tops, bottoms or braces by way of fluted hardwood dowel pins nested in white glue.
 2. All cabinet boxes shall be case clamped for a minimum of seven minutes in a Holzer case clamp to insure squareness.
 3. End panels shall be drilled for shelves, bottoms, tops and braces using the 32mm drilling system. All components will be drilled in corresponding patterns.
 4. End panels shall be rabbited at the rear for acceptance of 3/8" thick MCP back. The back will be mounted using mechanical fasteners. The back shall be removable.
 5. End panels shall have integral toe kicks and shall have a front of 3/4" MCP mechanically fastened to the end panels.
- B. Doors shall be of 1 1/16" thick laminated panel products with the front face laminated in the architect's color selection. The semi-exposed side shall be covered by white HPL plastic laminate. The edges shall be covered by PVC or self-edged.
- C. Drawers shall be constructed of 1/2" thick MCP, rabbited, glued and mechanically fastened for a strong bond. Bottoms shall be of 3/8" thick MCP mechanically fastened to the drawer box frame. Top edges shall be covered in white PVC edging. Drawer fronts are same construction as doors. Drawer fronts shall be removable from drawer box for easy alignment. Drawers shall have epoxy coated, nylon roller bearing, side mounted, bottom supported slides by BLUM.
- D. Shelves shall be of 3/4" thick MCP and edged with matching PVC edging. Shelves shall not be constructed over 42" in length.
- E. Braces shall be of 3/4" thick MCP and shall span the width of the cabinet box. Braces shall be edged on visible sides with PVC edging. On sink or range base cabinets the front brace shall be mounted vertically and shall be laminated to match the cabinet exterior.
- F. Backs shall be of 3/8" thick MCP and be rabbited in and mechanically fastened to the end panels.
- G. Wall cabinets shall be of 3/4" thick MCP and shall be dowel pinned in the same manner as the bases. Wall backs are 3/8" thick rabbited and mechanically fastened to end panels.

- H. Finished backs shall be of 3/4" MCP laminated with plastic laminate on face and edged with PVC.
- I. Top supports shall be of 3/4" MCP laminated on both sides and edged with PVC or plastic laminate.

PART 10 - COUNTERTOPS

- A. Countertops and backsplash shall be custom made with square, self-edge and shall be constructed of 3/4" thick medium density fiberboard (MDF) or 45# density particleboard (CS 236-66: Type 1, Grade B, Class 2) covered on all exposed surfaces with horizontal grade 10/HGS, .050" thickness, high pressure laminate as manufactured by a nationally known laminate company.
 - 1. Colors and patterns of plastic laminate shall be as selected by the Architect from full product line of national manufacturers such as Formica, Wilsonart, Pionite, Nevamar and Arborite, or an approved equal.
 - 2. Provide cutouts properly sized and located in tops for sinks and rims by others.
 - 3. Provide end splash, flush with all edges of countertop, where countertop abuts wall surfaces.

PART 11 - BRACING

Where countertops have no casework below for support, bracing or "cleats" shall be constructed 1½" x 1½" x length and covered by GP 28 plastic laminate on all exposed sides. These cleats shall be mounted at walls with mechanical fasteners to support the weight of the countertop.

PART 12 - WINDOW STOOLS

Plastic laminated window stools shall be 22mm moisture-resistant chipboard, Class E1, according to DIN EN 312/5, finished on top, bottom and sides with horizontal grade (HP) high pressure laminate as manufactured by a nationally known laminate company, using moisture-resistant adhesives. Provide sealant to back exposed edge of window stools, and caulk continuously between window and the laminate stool.

Colors and patterns of plastic laminate shall be as selected by the Architect from full product line of national manufacturers such as Formica, Wilsonart, Pionite, Nevamar and Arborite, or an approved equal.

PART 13 - COORDINATION

- B. Coordinate work of this section with related work of other sections as necessary to obtain proper installation of all items.
- C. Verify site dimensions of cabinet location in buildings prior to fabrication.
- D. Do not install casework until all concrete, masonry and plaster work is dry.

PART 14 - INSTALLATION

- A. Installation shall consist of assembling to form complete units, placing, leveling, scribing, trimming and anchoring.
 - 1. Filler between wall and casework shall not exceed 1" unless noted otherwise and shall be recessed 1/16" + from the face of casework.
 - 2. Plastic-laminate covered ceiling enclosures shall be flush with the face of the doors and 1/8" proud on the sides of exposed ends or backs.
- B. Fasten items to building construction as detailed or as otherwise required to provide a secure, permanent installation.
- C. Where fastening spacings or sizes are not shown, use spacings and sizes of bolts, screws, etc., which will develop the full strength of the members being fastened. Thus, failure due to over stress must occur in the members before occurring in the fastenings.
 - 1. Fastening to concrete shall be by anchor bolts embedded in masonry or by self-drilling masonry anchor.
 - 2. Fastening to masonry shall be of similar manner.
 - 3. Fastening to plaster or drywall construction shall be into wood studs or blocking placed there early in the construction. Toggle bolts may be used only in such cases where no blocking can be found, but fasteners must still penetrate solid wall supports for a secure installation.

PART 15 - PROTECTION

Upon installation of casework and countertops, all installed materials shall be covered with appropriate protection from further construction. The General Contractor will be responsible for repairing or replacing any product damaged by subsequent construction and finish work, with no additional cost to the Owner.

End of Section

SECTION 07200 - BUILDING INSULATION

PART 1 - SCOPE

- A. This Section includes all labor, materials, equipment and related items required to complete the work of building insulation as shown on the drawings and as specified.

PART 2 - SUBMITTALS

- A. Certificates of Compliance with applicable Federal Specifications shall be submitted to the architect for approval prior to delivery of any building insulation to the project. "R" values of insulation proposed to be furnished shall be included in certifications.
- B. Samples in duplicate of each type of building insulation shall be submitted to the architect for approval if requested.

PART 3 - MATERIALS

- A. Batt insulation shall be semi-rigid, spun glass fiber blankets; see Architectural plan sheets for R factor.
 - 1. Non-exposed blankets shall be enclosed on one side with strong asphalted paper vapor barrier where noted on plan sheets. Blankets shall be as wide as required to fit into stud, by longest available lengths.
 - 2. Exposed blankets for installation in wall space shall be Fiberglass batt faced (FSK-25)(Class A), having minimum material thermal resistance as noted.
- B. Sound attenuation blankets for areas where noted shall comply with requirements of ASTM C665-84, Type I. Same shall be 3" or 6" "Thermofiber", as manufactured by United States Gypsum; "Thermal-Acoustical Batts", as manufactured by Johns-Manville; "Noise Barrier Batt Insulation", as manufactured by Owens/Corning; or an approved equal.

PART 4 - INSTALLATION

- A. Batt insulation shall be installed in stud, in strict accordance with manufacturer's installation instructions. Insulation shall have full coverage in spaces involved, with tightly fitted butt joints where necessary and free from voids.
 - 1. Install insulation to the outside of any water piping occurring in exterior walls. In these cases, no insulation shall occur between water piping and wall finish.

END OF SECTION

SECTION 07212 - BOARD INSULATION

PART 1 - GENERAL

1.01 Work Included

- A. Board insulation at foundation wall.

1.02 Related Work

- A. Section 04330 - Reinforcement Unit Masonry System

1.03 References

- A. FS HH-I-524 - Insulation Board, Thermal (Polystyrene).

1.04 System Description

- A. Materials of this Section shall provide a continuous thermal barrier at building exterior wall.

PART 2 - PRODUCTS

2.01 Acceptable Insulation Manufacturers

- A. Styrofoam Brand
- B. AMOCO
- C. Foamular - R
- D. Substitutions: Under provisions of Section 01600, 01630.

2.02 Insulation Materials

- A. Insulation Extruded Cellular Polystyrene; thermal resistance "R" per inch of 5.0; minimum compressive strength of 30 psi water absorption by volume in accordance with ANSI/ASTM D2842 0.3 percent square.

2.03 Acceptable Adhesive Manufacturers

- A. Max Bond, by H.B. Fuller Company
- B. Liquid Nails, LN 601, Macco Adhesives
- C. Foam Adhesive by Franklin Int.

2.04 Adhesive Materials

- A. Adhesive Type recommended by insulation manufacturer for application.

PART 3 - EXECUTION

3.01 Preparation

- A. Verify substrate and adjacent materials and insulation boards are dry and ready to receive insulation and adhesive.
- B. Verify substrate surface is flat, free of honeycomb, fins, irregularities, materials that will impede adhesive bond.
- C. Verify insulation boards are unbroken, free of damage.

3.02 Installation - Perimeter Insulation

- A. Exterior sheathing for the face brick at the front of the building.

End of Section

SECTION 07270 - FIRESTOPPING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide all material, labor, equipment and services necessary to provide firestopping as follows:
 - 1. Through-penetration firestopping in fire rated construction.
 - 2. Construction-gap firestopping at connections in the same or different materials in fire rated construction.
 - 3. Construction-gap firestopping occurring within fire rated wall, floor or floor-ceiling assemblies.
 - 4. Construction-gap firestopping occurring at the top of fire rated walls.
 - 5. Through-penetration smoke-stopping in smoke partitions.
 - 6. Construction-gap smoke-stopping in smoke partitions.
- B. Firestopping specified in other Sections of these specifications:
 - 1. Plumbing Penetrations: Section 15
 - 2. Fire dampers and manufactured devices: Section 15
 - 3. Raceway seals and manufactured electrical devices: Section 16
- C. Alternates: Refer to "Description of Alternates" pages for description of alternates affecting work of this Section.

1.02 REFERENCES

- A. Underwriters Laboratories
 - 1. U.L. Fire Resistant Directory
 - a. Through-penetration firestop devices (XHCR)
 - b. Fire resistance ratings (BXUV)
 - c. Through-penetration firestop systems (XHEZ)
 - d. Fill, void or cavity material (XHHW)
- B. American Society for Testing and Materials Standards:
 - 1. ASTM E814-88: Standard Test Method for Fire Tests of Through-Penetration Firestops.

1.03 DEFINITIONS

- A. Assembly: Particular arrangement of materials specific to given type of construction described or detailed in referenced documents.
- B. Barriers: Time rated fire walls, smoke barrier walls, time rated ceiling/floor assemblies and structural floors.
- C. Firestopping: Methods and materials applied in penetrations and unprotected openings to limit spread of heat, fire, gasses and smoke.
- D. Penetration: Opening or foreign material passing through or into barrier or structural floor such that full thickness of rated materials is not obtained.
- E. Construction Gaps: Gaps between adjacent sections of walls, exterior walls, at wall tops between top of wall and ceiling, and structural floors or roof decks; and gaps between adjacent sections of structural floors.
- F. System: Specific products and applications, classified and numbered by Underwriters Laboratories, Inc., to close specific barrier penetrations.
- G. Sleeve: Metal fabrication or pipe section extending through thickness of barrier and used to permanently guard penetration. Sleeves are described as part of penetrating system in other sections and may or may not be required.

1.04 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Fire-rated construction: Maintain barrier and structural floor fire resistance ratings including resistance to cold smoke at all penetrations, connections with other surfaces or types of -construction, at separations required to permit building movement and sound or vibration absorption, and at other construction gaps.
 - 2. Smoke barrier construction: Maintain barrier and structural floor resistance to cold smoke at all penetrations, connections with other surfaces and types of construction and at all separations required to permit building movement and sound or vibration absorption, and at other construction gaps.

1.05 SUBMITTALS

- A. Comply with all requirement of Section 01300, Submittals.

1.06 QUALITY ASSURANCE

- A. Installer's qualifications: Firm experienced in installation or application of systems similar in complexity to those required for this Project, plus the following:
 - 1. Acceptable to or licensed by manufacturer, State or local authority where applicable.

2. At least two (2) years' experience with systems.
 3. Successfully completed at least five (5) comparable scale projects using this system.
- B. Local and State regulatory requirements: Submit forms or acceptance for proposed assemblies not conforming to specific UL Firestop System numbers, or UL classified devices.
- C. Materials shall have been tested to provide fire rating at least equal to that of the construction.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Packing and shipping:
1. Deliver products in original unopened packaging with legible manufacturer's identification.
 2. Coordinate delivery with scheduled installation date, allow minimum storage at site.
- B. Storage and protection: Store materials in a clean, dry, ventilated location. Protect from soiling, abuse, moisture and freezing when required. Follow manufacturer's instructions.

1.08 PROJECT CONDITIONS

- A. Existing conditions:
1. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
 2. Proceed with installation only after penetrations of the substrate and supporting brackets have been installed.
- B. Environmental requirements:
1. Furnish adequate ventilation if using solvent.
 2. Furnish forced air ventilation during installation if required by manufacturer.
 3. Keep flammable materials away from sparks or flame.
 4. Provide masking and drop cloths to prevent contamination of adjacent surfaces by firestopping materials.
 5. Comply with manufacturing recommendations for temperature and humidity conditions before, during and after installation of firestopping.

1.09 GUARANTEE

- A. Submit copies of written guarantee agreeing to repair or replace joint sealers which fail in joint adhesions, co-adhesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, or general durability or appear to deteriorate in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the exposure indicated. The guarantee period shall be one (1) year from date of substantial completion.

PART 2 - PRODUCTS

2.01 THROUGH-PENETRATION STOPPING OF FIRE-RATED CONSTRUCTION

- A. Systems or devices listed in the U.L. Fire Resistance Directory under categories XHCR and XHEZ may be used, providing that it conforms to the construction type, penetrant type, annual space requirements and fire rating involved in each separate instance, and that the system is symmetrical for wall applications. Systems or devices must be asbestos-free.
 - 1. Additional requirements: Withstand the passage of cold smoke either as an inherent property of the system, or by the use of a separate product included as a part of the U.L. system or device, and designed to perform this function.
 - 2. Acceptable manufacturers and products: Those listed in the U.L. Fire Resistance directory for the U.L. System involved and as further defined in the Systems And Applications Schedule.
 - 3. All firestopping products must be from a single manufacturer. All Trades shall use products from the same manufacturer.

2.02 CONSTRUCTION-GAP FIRESTOPPING OF FIRE-RATED CONSTRUCTION

- A. Firestopping at construction gaps between edges of floor slabs and exterior wall construction.
- B. Firestopping at construction gaps between tops of partitions and underside of structural systems.
- C. Firestopping at construction gaps between tops of partitions and underside of ceiling or ceiling assembly.
- D. Firestopping of control joints in fire-rated masonry partitions.
- E. Firestopping expansion joints.
- F. Acceptable manufacturers and products: Those listed in the U.L. Fire Resistance Directory for the U.L. System involved and as further defined in the Systems and Applications Schedule.

2.03 SMOKE-STOPPING AT SMOKE PARTITIONS

- A. Through-penetration smoke-stopping: Any system complying with the requirements for through-penetration Firestopping in fire-rated construction, as specified in The Systems and Applications Schedule is acceptable, provided that the system includes the specified smoke seal or will provide a smoke seal. The length of time of the fire resistance may be disregarded.
- B. Construction-gap smoke-stopping: Any system complying with the requirements for construction-gap Firestopping in fire-rated construction, as specified in the Systems and Applications Schedule is acceptable, provided that the system includes the specified smoke seal or will provide a smoke seal. The length of time of the fire resistance may be disregarded.

2.04 ACCESSORIES

- A. Fill, void or cavity materials: As classified under category XHHW in the U.L. Fire Resistance Directory.
- B. Forming materials: As classified under category XHKU in the U.L. Fire Resistance Directory.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 - 1. Verify barrier penetrations are properly sized and in suitable condition for application of materials.
 - 2. Do not proceed until unsatisfactory conditions have been corrected.

3.02 CLEANING SURFACES

- A. Clean surfaces to be in contact with penetration seal materials, of dirt, grease, oil, loose materials, rust or other substances that may affect proper fitting, adhesion or the required fire resistance.

3.03 INSTALLATION

- A. Install penetration seal materials in accordance with printed instructions of the U.L. Fire Resistance Directory and in accordance with manufacturer's instructions.
- B. Seal holes or voids made by penetrations to ensure an effective smoke barrier.
- C. Where floor openings without penetrating items are more than 4" in width and subject to traffic or loading, install firestopping materials capable of supporting same loading as floor.

- D. Protect materials from damage on surfaces subject to traffic.
- E. Place firestopping in annular space around fire dampers before installation of damper's anchoring flanges which are installed in accordance with fire damper manufacturer's recommendations.
- F. Where large openings are created in walls or floors to permit installation of pipes, ducts, cable tray, bus duct or other items, close unused portions of opening with firestopping material tested for the application. See U.L. Fire Resistance Directory.
- G. Install smoke stopping as specified for firestopping.
- H. Where rated walls are constructed with horizontally continuous air space, double width masonry, or double stud frame construction, provide vertical, 12" wide fiber dams for full thickness and height of air cavity at maximum 15' intervals.

3.04 FIELD QUALITY CONTROL

- A. Examine penetration sealed areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Perform under this Section, patching and repairing of firestopping caused by cutting or penetration by other Trades.

3.05 ADJUSTING AND CLEANING

- A. Clean up spills of liquid components.
- B. Neatly cut and trim materials as required.
- C. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

END OF SECTION

SECTION 07900 - JOINT SEALERS

PART 1 - SCOPE

- A. This Section includes all labor, materials, equipment, and related items required for the work of caulking as shown on the Drawings and as specified herein. Work under this Section includes but is not necessarily restricted to the following:
 - 1. Caulking of exterior or interior expansion or control joints in concrete or masonry.
 - 2. Other joints, exterior or interior, in the building construction shown, specified, or required to be caulked.

PART 2 - SUBMITTAL

- A. Contractor shall submit to the Architect, in duplicate, for approval the following items prior to furnishing any materials at the job site.
 - 1. Sample cards of all exposed caulking and sealant for color approval. Unless otherwise directed, apply samples in minimum 3" runs on cards.
 - 2. One lineal foot of each type of backer material proposed.

PART 3 - PRODUCT HANDLING

- A. Deliver caulking, and related accessories to the job site in factory sealed, unopened containers bearing manufacturer's name and product designation.
- B. Store materials in unopened containers, following manufacturer's recommendations for storage temperature and shelf life.
- C. Follow manufacturer's recommendation for handling products containing toxic substances. Keep flammable materials away from heat, sparks, and open flames. Use recommended solvents and cleaning agents for cleaning tools and equipment.

PART 4 - ENVIRONMENTAL CONDITIONS

- A. Schedule caulking operations so that working joints are most likely to be normal size. Apply materials within manufacturer's recommended surface and ambient temperature range.

PART 5 - PROTECTION

- A. Use masking tape where practicable to control lap of materials onto adjacent surfaces or to facilitate tooling. Remove tape immediately after caulking operation.

PART 6 - MATERIALS

- A. General. All caulking, primers, and accessories shall be non-staining to adjacent exposed materials. Products having similar application and usage shall be of the same manufacturer and type. Unless otherwise specified, colors shall be selected from approved manufacturer's standard color sections. Use gun consistency compounds unless otherwise required by job conditions.
- B. Exterior caulking shall be a one or two-component polysulfide base, elastic, synthetic rubber compound, conforming to Federal Spec. TT-S-00230, and shall be "Sonolastic" as manufactured by the Sonneborn Building Products, Inc., "Synthacalk" as manufactured by the Pecora Chemical Corp., or "Rubber Calk 500" as manufactured by the Products Research & Chemical Corp or an approved equal.
 - 1. Colors shall be from manufacturer's standards as selected by the Architect.
- C. Interior caulking for general use shall be a one-component acrylic latex compound, and shall be "Sonolac" as manufactured by the Sonneborn Building Products, Inc. "AC-20" as manufactured by the Pecora Chemical Corp., or "Latex Caulk" as manufactured by DAP, Inc.
- D. Primers shall be as manufactured and recommended for each substrate by the manufacturer of each caulking compound used in the work.
- E. Backer materials shall be as recommended for and compatible with each caulking used, and shall be as follows unless otherwise required to meet specific job conditions.
 - 1. Backer rod for use in all joints requiring backer for caulking shall be a soft, closed cell polyethylene foam meeting requirements of AASHO Specifications M153-54, Type I and III, and shall be as manufactured by the Dow Corning Corp., Sonneborn Building Products, Inc., or Williams Products, Inc.
- F. Release material, where required, shall be polyethylene film.

PART 7 - MIXING

- A. Job mix multi-component sealants with suitable power operated equipment, following specific directions of sealant manufacturer.
- B. Base and accelerator components of multi-part sealants shall have batch control numbers clearly indicated on containers. Control numbers for mixed components shall be identical.

PART 8 - CONDITION OF SURFACES

- A. Inspect all surfaces to receive caulking materials, and report all defects. Starting work implies acceptance of surfaces as satisfactory. Verify that joints and spaces to be caulked are of proper width.

- B. Concrete surfaces shall be thoroughly cured.
- C. Apply no caulking materials in contact with surfaces contaminated with oil, grease, bituminous materials, form release agents, bond breakers, deleterious curing compounds, water repellents, and other special surface treatments. Aluminum surfaces shall be free of lacquer. Costs incurred by removal of such contaminants shall be borne by the trades responsible for their presence.

PART 9 - PREPARATION

- A. Thoroughly clean all joints, removing all foreign matter such as dirt, dust, moisture, frost, rust, paint, lacquer, and protective coatings. Blow all joints free of loose particles.
- B. Use no cleaning solvents which leave residue. Wipe joints free of solvent using clean, dry white cloths or white lint less paper. Do not permit solvent to air dry.
- C. Follow manufacturer's directions for products and surfaces.

PART 10 - INSTALLATION

- A. Unless otherwise required by these specifications, install materials in strict accordance with manufacturer's specifications and recommendations, using approved equipment.
- B. Usage of various materials shall be as specified under Article 6 above.
- C. Prime surfaces as recommended by the manufacturer's immediately prior to caulking or sealing. Make preliminary tests to ensure that primers will not stain exposed materials or deteriorate backer materials.
- D. Unless otherwise required by caulking manufacturer's specifications and recommendations, use backer material to control caulking and sealant depth as follows (depths measured at bond face).
 - 1. Polysulfide and Polyurethane Sealants. For joints up to 1/2" wide and less, make depth equal to width but not less than 1/4". Joints over 1/2" wide shall be 3/8" deep.
 - 2. Acrylic Sealant. For joints 1/2" wide and less, make depth equal to width but not less than 1/4". Joints over 1/2" wide shall be 3/8" deep.
 - 3. Do not twist or stretch preformed backer materials during installation.
- E. At joints subject to movement, where required by nature of backer material used or where sealant contacts back of joint, use release material between backer material or back of joint and sealer to confine adhesion to surfaces of materials being joined. Follow manufacturer's recommendation exactly.

- F. Neatly tool joints to slightly concave surface using tooling agent recommended by sealant manufacturers. Repair any air pockets exposed by tooling. Tool so as to compress material and improve adhesion to surfaces joined.

PART 11 - PATCHING

- A. Patch or replace defective or damaged sealants as directed by the Architect. Be responsible for damage to adjacent surfaces caused by caulking and sealing operations.

PART 12 - CLEANING

- A. Clean adjacent surfaces soiled by caulking and sealing operations. Remove wet material before it "sets". Follow manufacturer's recommendations for cleaning procedures. Cleaning agents shall not stain or be injurious to exposed surfaces nor shall they be potentially dangerous to glass and metal surfaces due to wash-off by rain.

END OF SECTION

SECTION 08100 - METAL DOORS AND FRAMES

PART 1 - RELATED DOCUMENTS

- A. General provisions of Contract, General and Special Conditions, and General Requirements apply to this Section.

PART 2 - DESCRIPTION OF WORK

- A. Provide labor, materials, equipment, and services necessary for proper and complete installation of all hollow metal work.
- B. Include all view windows and side lights indicated on Drawings.
- C. Work Specified in Other Sections.
 - 1. Finish Hardware is specified in another Division 8 Section.

PART 3 - LABEL CONSTRUCTION

Where Label Construction is indicated in Door and Frame Schedule, materials and construction of doors and frames shall be in accordance with and bear indicated resistive rating label of Underwriters' Laboratories, Inc.

PART 4 - SUBMITTALS

Submit Shop Drawings for all work, indicating materials, uses, gauges, details of construction, connections to other work, fastenings, and anchors, to Architect for his review. Do not start fabrication until these Drawings are approved.

PART 5 - MATERIALS

- A. Manufacturers offering products complying with requirements include:
 - Steelcraft Mfg. Co.
 - Republic Steel Corporation
- B. Materials used shall be of best quality of their respective kinds.
- C. Steel in general shall be cold rolled stretcher level, prime quality steel, of U.S. Standard gauge as specified under the various headings.
- D. Doors, frames and framed openings exposed to the exterior shall be fabricated of zinc coated steel in the gauges scheduled. The steel shall be hot dipped so as to provide a ductile coating, tightly adherent to the base steel. The zinc coating shall be an A60 coating in accordance with ASTM specification A525 (.6 oz. of zinc per sq. ft. of steel total coverage.)

PART 6 - HOLLOW METAL STEEL DOORS, POLYURETHANE CORE

- A. Physical Properties:
 - “R” Factor: 11.1
 - “U” Factor: .09
 - Compression Strength: 3600 P.S.F.
- B. Doors shall be equal to those manufactured by The Steelcraft Manufacturing Company, Cincinnati, Ohio, and designated as:
LF-18 (1-3/4", 18 guage steel)
- C. Doors shall be fabricated of:
 - 1. Cold rolled steel, interior.
 - 2. Galvanized steel with a zinc coating of .6 ozs. per square foot total, exterior.
- D. Door shall be flush with edge seams filled and ground smooth.
- E. Doors shall have 1/8" bevel in 2" on hinge and ground smooth.
- F. Doors shall have vertical mechanical interlocking seams on hinge and lock edges.
- G. Doors shall be provided with top and bottom inverted 14 gage steel channels spot welded within the door.
- H. Doors shall be mortised and adequately reinforced for all hardware.
 - 1. Mortised hardware reinforcements shall be drilled and tapped at the factory.
 - 2. Surface applied hardware shall be field drilled by others.
- I. Doors shall be reinforced internally with a 14 guage steel reinforcement for surface closers when specified.
- J. Out swinging exterior doors shall be provided with top caps for protection against weather and with a polyurethane core.
- K. Doors shall be phosphatized and receive one coat of baked on prime paint.

PART 7 - FRAMES

- A. Fabricate frames of 16 ga. steel. Manufacturers offering products complying with the requirements include:
 - Steelcraft Mfg. Co.
 - Republic Steel Corp.
 - Fenestra, Inc.
- B. All frames shall have welded and mitered corners, equivalent to Steelcraft Type D-16. (Issue A).

- C. Frames in stud walls can be KD frames.
- D. Provide suitable anchors for jambs as required by wall construction. Provide a minimum of six (6) jamb anchors and two (2) base anchors per frame. Provide anchors as required for labeled frames.
- E. Reinforcing channels, where called for, shall be 12 gauge reinforcing channel in head.

PART 8 - HARDWARE REINFORCEMENTS

- A. Accurately mortise, reinforce, drill, and tap at factory all work to receive hardware, except do drilling and tapping for door checks and brackets at building.
- B. Reinforcements shall be of ample size and thickness to stiffen work against strain of service required. Reinforcements for locks and escutcheons shall be box type with spring lead contacts for lock cases.
- C. Provide cover boxes in back of all hardware cutouts in combination type frames.

PART 9 - FINISH

- A. All steel hollow metal work shall be phosphatized and receive one coat baked on prime coat.
- B. Each coat shall be baked on and sanded smooth.

PART 10 - INSTALLATION

- A. Set frames in their proper locations, plumb and true and securely braced in position.
- B. Receive, store and protect and be responsible for all doors to be installed hereunder. Report immediately to Contractor shortages, damage, improper preparation, defective finishes and warped doors. Do not install any material not perfect in every respect.
- C. Inspect openings and frames to receive doors. Report damage or discrepancy affecting proper installation of units to Contractor, and have corrective work done in a suitable and satisfactory manner.
- D. Install doors in openings as indicated on Drawings in conformance with shop drawings and hardware schedule. Install doors so they hang plumb and true, with proper clearances using items of hardware scheduled for openings.
- E. Accurately set all frames and thoroughly and rigidly anchor and fasten in place in building construction. Weld drywall anchors to frames.
- F. Check frames before and after walls are constructed to see that they are properly erected.

End of Section

SECTION 08211 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes the following:

1. Solid core doors with wood veneer faces.
2. Factory fitting flush wood doors to frames and factory matching for hardware.
3. Glazing stops and preparation of flush doors to receive glazing; glazing specified elsewhere.

- B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Architectural Woodwork: Division 6.
2. Metal Door Frames: Elsewhere in Division 8.
3. Door Hardware: Elsewhere in Division 8.
4. Glass and Glazing: Elsewhere in Division 8.
5. Field Finishing of Wood Doors: Section 09900 - Painting.

1.03 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for each type of door, including details of core and edge construction, trim for openings and louvers, and factory-finishing specifications.
- C. Shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for veneer matching and factory finishing and other pertinent data.
 1. For factory-machined doors, indicate dimensions and locations of cutouts for locksets and other cutouts adjacent to light and louver openings.
- D. Samples for verification in the form and size indicated below:
 1. Corner sections of doors approximately 12 inches (300 mm) square with door faces and edging representing the typical range of color and grain for each species of veneer and solid lumber required.
 2. Louvers consisting of blade and frame, 6 inches (150 mm) long, for each material and finish specified.
 3. Frames for light openings, 6 inches (150 mm) long, for each material, type, and finish required.

1.04 QUALITY ASSURANCE

A. Quality Standard: Comply with the following standard:

1. AWI Quality Standard: "Architectural Woodwork Quality Standards: of the Architectural Woodwork Institute for grade of door, core, construction, finish, and other requirements.

B. Fire-Rated Wood Doors: Provide wood doors that comply with NFPA 80; are identical in materials and construction to units tested in door and frame assemblies per ASTM E 152; and are labeled and listed by UL, Warnock Hersey, or another testing and inspection agency acceptable to authorities having jurisdiction.

C. Single-Source Responsibility: Obtain doors from one source and by a single manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect doors during transit, storage, and handling to prevent damage, soiling, and deterioration. Comply with requirements of referenced standard and manufacturer's instructions.

B. Identify each door with individual opening numbers as designated on shop drawings, using temporary, removable, or concealed markings.

1.06 PROJECT CONDITIONS

A. Conditioning: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during the remainder of the construction period to comply with the following requirements applicable to Project's geographical location:

1. AWI quality standard Section 100-S-11 "Relative Humidity and Moisture Content."

1.07 WARRANTY

A. General Warranty: Door manufacturer's warranty 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.

- B. Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form signed by manufacturer, Installer, and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup, or twist) more than 1/4 inch (6.35 mm) in a 42-by-84-inch (1067-by-2134-mm) section or that show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 75-mm) span, or do not conform to tolerance limitations of referenced quality standards.
1. Warranty shall be in effect during the following period of time after date of Substantial Completion.
 - a. Solid Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide doors by one of the following:
1. Solid Core Doors:
 - a. Algoma Hardwoods, Inc.
 - b. Eggers Industries, Architectural Door Division
 - c. Fenestra Corporation
 - d. Graham Manufacturing Corp.
 - e. Mohawk Flush Doors, Inc.
 - f. V-T Industries, Inc.
 - g. Weyerhaeuser Co.

2.02 INTERIOR FLUSH WOOD DOORS

- A. Solid Core Doors for Transparent Finish: Comply with the following requirements:
1. Faces: See Finish Schedule
 2. Grade: Premium
 3. Construction: 5 or 7 plies
 4. Core: Particleboard core
 5. Bonding: Stiles and rails bonded to core, then entire unit abrasive planed before veneering.
- B. Fire-Rated Solid Core Doors: Comply with the following requirements:
1. Faces and Grade: Provide faces and grade to match non-fire-rated doors in same area of building, unless otherwise indicated.
 2. Construction: Manufacturer's standard core construction as required to provide fire-resistance rating indicated.

3. Blocking: Provide composite blocking designed to maintain fire resistance of door but with improved screw-holding capability of same thickness as core and with minimum dimensions as follows:
 - a. 5-inch (125-mm) top rail blocking
 - b. 5-inch (125-mm) bottom rail blocking
 - c. 5-by-18-inch (125-by-450-mm) lock blocks
 - d. 5-inch (125-mm) midrail blocking.
4. Edge Construction: Provide manufacturer's standard laminated-edge construction for improved screw-holding capability and split resistance as compared to edges composed of a single layer of treated lumber.
5. Pairs: Provide fire-rated pairs with fire-retardant stiles that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals.

2.03 LIGHT FRAMES

- A. Wood-Veneered Beads for Light Openings in Fire Doors.

2.04 FABRICATION

- A. Fabricate flush wood doors to comply with following requirements:
 1. In sizes indicated for job-site fitting:
 - a. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements of NFPA 80 for fire-resistance-rated doors.
 - b. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with factory machining.
 - c. Metal Astragals: Pre-matching astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- B. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.
 1. Light Openings: Trim openings with moldings of material and profile indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine installed door frames prior to hanging door:
 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
 2. Reject doors with defects.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Hardware: For installation see Division 8 Section "Finish Hardware."
- B. Manufacturer's Instructions: Install wood doors to comply with manufacturer's instructions and referenced quality standard and as indicated.
 - 1. Install fire-rated doors in corresponding fire-rated frames according to requirements of NFPA 80.
- C. Job-Fit Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
 - 1. Fitting Clearances for Non-Fire-Rated Doors: Provide 1/8 inch (3.2 mm) at jambs and heads, 1/16 inch (1.6 mm) per leaf at meeting stiles for pairs of doors, and 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4-inch (6.4 mm) clearance from bottom of door to top of threshold.
 - 2. Fitting Clearances for Fire-Rated Doors: Comply with NFPA 80.
 - 3. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
 - 4. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) on lock edge; trim stiles and rails only to extent permitted by labeling agency.
- D. Field-Finished Doors: Refer to Division 9, Section 09900 - Painting, for finishing requirements.

3.03 ADJUSTING AND PROTECTION

- A. Operation: Rehang or replace doors damaged during installation.
- B. Finished Doors: Refinish or replace doors damaged during installation.
- C. Protect doors as recommended by door manufacturer to ensure that wood doors will be without damage or deterioration at the time of Substantial Completion.

End of Section

SECTION 08330
OVERHEAD COILING SERVICE DOORS
625 SERIES INSULATED SERVICE DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Overhead coiling insulated doors.

1.2 RELATED SECTIONS

- A. Section 05500 - Metal Fabrications: Support framing and framed opening.
- B. Section 06200 - Finish Carpentry: Wood jamb and head trim.
- C. Section 09900 – Paints and Coatings:
- D. Section 16130 - Raceway and Boxes: Conduit from electric circuit to door operator and from door operator to control station.

1.3 REFERENCES

- A. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- C. NEMA MG 1 - Motors and Generators.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

- A. Overhead coiling insulated doors:
 - 1. Wind Loads: Design door assembly to withstand wind/suction load of 20 psf (958 Pa) without damage to door or assembly components.
 - 2. Operation: Design door assembly, including operator, to operate for not less than 20,000 cycles.
- B. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.

- 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. Details of construction and fabrication.
 - 4. Installation instructions.
- C. Shop Drawings: Include detailed plans, elevations, details of framing members, anchoring methods, required clearances, hardware, and accessories. Include relationship with adjacent construction.
- D. Selection Samples: For each finish product specified, complete set of color chart representing manufacturer's full range of available colors.
- E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.
- F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- G. Operation and Maintenance Data: Submit lubrication requirements and frequency, and periodic adjustments required.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.
- B. Installer Qualifications: Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.

- B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.
- C. Store materials in a dry, warm, ventilated weathertight location.

1.8 PROJECT 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.

1.9 COORDINATION

- A. Coordinate Work with other operations and installation of adjacent materials to avoid damage to installed materials.

PART 2 PRODUCTS

2.1 MANUFACTURERS

Acceptable Manufacturer: Overhead Door Corp. or reviewed equal.

2.2 INSULATED OVERHEAD COILING SERVICE DOORS

- A. Overhead Coiling Stormtite Insulated Service Doors: Overhead Door Corporation 625 Series.
 - 1. Curtain: Interlocking roll-formed slats as specified following. Endlocks shall be attached to each end of alternate slats to prevent lateral movement.
 - a. Flat profile type F-265I for doors up to 40 feet (12.19 m) wide.
 - b. Front slat fabricated of:
 - 1) 22 gauge galvanized steel.
 - c. Slat cavity filled with CFC-free foamed-in-place, polyurethane insulation.
 - 2. Finish:
 - a. Galvanized Steel: Slats and hood galvanized in accordance with ASTM A 653 and receive rust-inhibitive, roll coating process, including 0.2 mils thick baked-on prime paint, and 0.6 mils thick baked-on polyester top coat; Polar White.
 - 1) Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer.
 - b. Vinyl bottom seal, exterior guide and internal hood seals.
 - c. Interior guide weatherseal.
 - d. Lintel weatherseal.

3. Bottom Bar:
 - a. Two galvanized steel angles minimum thickness 1/8 inch (3 mm) bolted back to back to reinforce curtain in the guides (Powder Coated to Match Curtain).
4. Guides:
 - a. Three prime painted structural steel angles with minimum thickness of 3/16 inch (4.76 mm).
 - b. Guides weatherstripped with a vinyl weather seal at each jamb, on the exterior curtain side.
5. Brackets:
 - a. Hot rolled prime painted steel to support counterbalance, curtain and hood.
6. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel, supporting the curtain with deflection limited to 0.03 inch per foot of span. Counterbalance is adjustable by means of an adjusting tension wheel.
7. Hood: Provide with internal hood baffle weatherseal.
 - a. 24 gauge galvanized steel with intermediate supports as required.
8. Electric Motor Operation: Provide UL listed electric operator, size as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second.
 - a. Sensing Edge Protection:
 - 1) Electric sensing edge.
 - b. Operator Controls:
 - 1) Interior Location / Push-button operated control stations with open, close, and stop buttons.
 - 2) Exterior Location / Key operation with open, close, and stop controls.
 - 3) Controls surface mounted.
 - c. Special Operation:
 - 1) Door timer operation.
 - d. Motor Voltage: see electrical plans.
9. Locking:
 - a. Interior slide bolt lock for electric operation with interlock switch.
10. Wall Mounting Condition:
 - a. Face-of-wall mounting.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify opening sizes, tolerances and conditions are acceptable.
- B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.

- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install 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. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components (Electrical Contractor to supply and install power and control wires. Door Contractor to make wiring connections).
- F. Instruct Owner's personnel in proper operating procedures and maintenance schedule.

3.4 ADJUSTING

- A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.
- B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

- A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.

END OF SECTION

SECTION 08410 - ALUMINUM ENTRANCES AND WINDOWS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division - 1 specification sections, apply to Work of this Section.

1.02 DESCRIPTION OF WORK

- A. Extent of aluminum entrances and windows is shown on drawings and schedules.
- B. Types of aluminum entrances and windows required include the following:
 - 1. Exterior entrance doors.
 - 2. Curtain Wall type framing system.
- C. Glazing: Refer to "Glass and Glazing" section of Division 8 for glazing requirements for aluminum entrances and windows, including doors.
- D. Finish hardware for aluminum doors is included as Work of this Section.
 - 1. Cylinders for locks are specified with "Finish Hardware" in another Division 8 section.
- E. Sealant around perimeter of aluminum frames is specified elsewhere in Division 7 section.
- F. Comply with provisions of Section 01028 - Modification Requirements.

1.03 SYSTEM PERFORMANCES

- A. General: Provide exterior entrance and curtain wall and windows assemblies that have been designed and fabricated to comply with requirements for system performance characteristics listed below as demonstrated by testing manufacturer's corresponding stock systems according to test methods designated.
- B. Thermal Movement: Allow for expansion and contraction resulting from ambient temperature range of 120°F (49°C).
- C. Wind Loading: Provide capacity to withstand loading indicated below, tested per ASTM E 330.
 - 1. Uniform pressure of 30 psf inward and 30 psf outward.

- D. Transmission Characteristics of Fixed Framing: Comply with requirements indicated below for transmission characteristics and test methods.
 - 1. Air and Water Leakages: Air infiltration of not more than 0.06 CFM per sq. ft. of fixed area per ASTM E 283 and no uncontrolled water penetration per ASTM E 331 at pressure differential of 8.0 psf (excluding operable door edges).
- E. Transmission Characteristics of Entrances: Provide entrance doors with jamb and head frames which comply with requirements indicated below for transmission characteristics and test methods.
 - 1. Air Leakage: Air infiltration per linear foot of perimeter crack of not more than 0.50 CFM for single doors and 1.0 CFM for pairs of doors per ASTM E 283 at pressure differential of 1.567 psf.

1.04 QUALITY ASSURANCE

- A. Drawings are based on one manufacturer's standard aluminum entrance and windows system. Another standard system of a similar and equivalent nature will be acceptable when differences do not materially detract from design concept or intended performances, as judged solely by Architect.

1.05 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications, standard details, and installation recommendations for components of aluminum entrances and curtain wall and windows required for Project, including test reports certifying that products have been tested and comply with performance requirements.
- B. Shop Drawings: Submit shop drawings for fabrication and installation of aluminum entrances and curtain wall and windows, including elevations, detail sections of typical composite members, hardware mounting heights, anchorages, reinforcement, expansion provisions, and glazing.
- C. Samples: Submit samples of color of aluminum finish, on 12" long sections of extrusions or formed shapes and on 6" square sheets.

1.06 SPECIAL PROJECT WARRANTY

- A. Provide written warranty signed by Manufacturer, Installer, and Contractor agreeing to replace aluminum entrances and windows which fail in materials or workmanship within 3 years of acceptance. Failure of materials or workmanship includes excessive leakage or air infiltration, excessive deflections, faulty operation of entrances, deterioration of finish or construction in excess of normal weathering, and defects in hardware, weatherstripping, and other components of the work.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following or an approved equal:
 - 1. YKK AP America
 - 2. Kawneer Company, Inc.
 - 3. PPG Industries, Inc.
 - 4. Tubelite Div., Indal Inc.
 - 5. Amarlite/Arco Metals Co.

2.02 MATERIALS AND ACCESSORIES

- A. Aluminum Members: Alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish; ASTM B 221 for extrusions, ASTM B 209 for sheet/plate.
- B. Fasteners: Aluminum, non-magnetic stainless steel, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum components.
 - 1. Do not use exposed fasteners except where unavoidable for application of hardware. Match finish of adjoining metal.
 - 2. Provide Phillips flat-head machine screws for exposed fasteners.
- C. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible; otherwise, nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.
- D. Concrete/Masonry Inserts: Cast iron, malleable iron, or hot-dip galvanized steel complying with ASTM A 386.
- E. Bituminous Coatings: Cold-applied asphalt mastic complying with SSPC-PS 12, compounded for 30-mil thickness per coat.
- F. Compression Weatherstripping: Manufacturer's standard replaceable stripping of either molded neoprene gaskets complying with ASTM D 2000 or molded PVC gaskets complying with ASTM D 2287. Weatherstripping shall be equal to Kawneer Sealair Weathering System, YKK, or an approved equal, which shall include head and jamb, astragal, and bottom weatherstripping.
- G. Glazing Materials: Provide manufacturers standard EDPM glazing gaskets.
- H. Sealant: Provide all sealant necessary within aluminum assemblies. Perimeter sealant around frames shall be included under Section 07900.

2.03 HARDWARE

- A. General: Refer to hardware section of Division 8 for requirements for hardware items other than those indicated herein to be provided by manufacturer of aluminum entrances.
- B. Thresholds: Extruded aluminum in mill finish, ADA compliance, complete with anchors, coordinated with pivots of size indicated or manufacturer's standard if not indicated. Set thresholds in full bed of sealant.

2.04 FABRICATION

- A. General - Sizes and Profiles: Required sizes for door and frame units, including profile requirements, are indicated on drawings.
 - 1. Details shown are based upon standard details by manufacturer indicated. Similar details by other manufacturers listed will be acceptable, provided they comply with other requirements, including profile limitations.
- B. Prefabrication: To greatest extent possible, complete fabrication, assembly, finishing, hardware application, and other work before shipment to project site. Disassemble components only as necessary for shipment and installation.
 - 1. Do not drill and tap for surface-mounted hardware items until time of installation at project site.
 - 2. Perform fabrication operations, including cutting, fitting, forming, drilling, and grinding of metal work in manner which prevents damage to exposed finish surfaces. For hardware, perform these operations prior to application of finishes.
- C. Reinforcing: Install reinforcing as necessary for performance requirements; separate dissimilar metals with bituminous paint or other separator which will prevent corrosion.
- D. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.
- E. Fasteners: Conceal fasteners wherever possible.
- F. Weatherstripping: For exterior doors, provide compression weatherstripping against fixed stops; at other edges, provide sliding weatherstripping retained in adjustable strip mortised into door edge.
 - 1. Provide EPDM/vinyl blade gasket weatherstripping in bottom door rail, adjustable for contact with threshold.
 - 2. At interior doors and other locations without-weatherstripping, provide neoprene silencers on stops to prevent metal-to-metal contact.

2.05 STOREFRONT FRAMING SYSTEM

- A. General: Provide inside-outside matched resilient flush-glazed system fabricated for stick-type erection procedure, with provisions for glass replacement.
 - 1. Drawings are based on YKK, Simular by Kawneer, or an approved equal:
 - a. All aluminum doors, medium style.
 - b. All exterior windows and storefront: YKK Model YES 45TU System (2" x 4½") for 1" glazing. Aluminum door, single glazed.
 - c. Interior windows: YKK Model YES 40F-1, shall be 2" x 4" center glazed for non-insulated glass.
 - 2. Provide thermal-break frame members.

2.06 STILE-AND-RAIL TYPE ALUMINUM DOORS

- A. Frame: Provide tubular frame members, fabricated with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods or j-bolts, or fabricate with structurally welded joints, at manufacturer's option.
- B. Glazing: Fabricate doors to facilitate replacement of glass, without disassembly of door stiles and rails. Provide square snap-on extruded aluminum glazing stops, with exterior stops anchored for non-removal.

2.07 FINISH

- A. All exposed aluminum surfaces shall be free of scratches and other serious blemishes.
 - 1. Finish shall be YKK standard finish YSIN, clear matte, or an approved equal.
 - 2. Hardware to match door.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations for installation of aluminum entrances and windows.
- B. Set units plumb, level, and true to line, without warp or rack of framing members, doors. Anchor securely in place, separating aluminum and other corrodible metal surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
- C. Drill and tap frames and doors and apply surface-mounted hardware items, complying with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.

- D. Set sill members and other members in bed of sealant to provide weathertight construction.
- E. Refer to "Glass and Glazing" section of Division 8 for their installation of glass shown to be glazed into doors and framing.

3.02 ADJUST AND CLEAN

- A. Adjust operating hardware to function properly, without binding, and to provide tight fit at contact points and weatherstripping.
- B. Clean completed system, inside and out, promptly after erection and installation of glass and sealants. Remove excess glazing and sealants, dirt, and other substances from aluminum surfaces.
- C. Institute protective measures and other precautions required to assure that aluminum entrances and curtain wall and windows will be without damage or deterioration other than normal weathering at time of acceptance.

END OF SECTION

SECTION 08710

PART 1 – GENERAL

1.0 Related Documents

Drawings and general provisions of contract and Division 1 specification sections, apply to work of this section

1.01 SUMMARY

- A. Section Includes:
 - 1. Door Hardware.
 - 2. Storefront and Entrance Door Hardware.
 - 3. Installation of Finish Hardware.
- B. Related Sections:
 - 1. Section 06200 - Finish Carpentry
 - 2. Section 07900 - Joint Sealers – exterior thresholds
 - 3. Section 08100 – Metal Doors and Frames
 - 4. Section 08200 - Wood and Plastic Doors
 - 5. Section 08400 – Entrances and Storefronts
- C. Specific Omissions: Hardware for the following is specified or indicated elsewhere.
 - 1. Windows.
 - 2. Cabinets, including open wall shelving and locks.
 - 3. Signs, except where scheduled.
 - 4. Toilet accessories, including grab bars.
 - 5. Folding Partitions, except cylinders where detailed.
 - 6. Sliding aluminum doors, except cylinders where detailed.
 - 7. Access doors and panels, except cylinders where detailed.

1.02 REFERENCES

- A. Use date of standard in effect as of BID date.
- B. American National Standards Institute – ANSI 156.18 – Materials and Finishes.
- C. ICC/ANSI A117.0 – 1998 – Specifications for making buildings and facilities usable by physically handicapped people.
- D. ADA – Americans with Disabilities Act of 1990.
- E. BHMA – Builders Hardware Manufacturers Association.
- F. DHI – Door and Hardware Institute
- G. NFPA – National Fire Protection Association
 - 1. NFPA 80 – Fire Doors and Windows
 - 2. NFPA 101 – Life Safety Code
 - 3. NFPA 105 – Smoke and Draft Control Door Assemblies
 - 4. NFPA 252 – Fire Tests of Door Assemblies

1.03 SUBMITTALS

ARCHITECT'S HARDWARE SCHEDULE:

Architect's hardware schedule is by hardware set number. Refer to drawings for designation of hardware set number applicable to each opening. Certain additional items of hardware and/or hardware accessories specified herein shall be finished and noted on the hardware schedule.

SUPPLIER'S HARDWARE SCHEDULE

A complete hardware schedule, indicating type, number, location, and finish shall be submitted to architect for approval, together with such samples as may be required for review. Opening numbers shall be same as used in contract documents. Schedule shall be prepared according to Door and Hardware Institute recommendations (schedule and sequence format) and shall include degree of door closer installation.

Supplier's hardware schedule will be reviewed by architect for type, quality, finish, and for function (other than hand). Contractor shall be responsible for checking schedule for correct hand of locksets and for supplying quantity of items required by contract documents.

Provide supplementary or revised hardware schedules if deemed necessary by architect.

Do not ship or deliver hardware to job prior to review of hardware schedules by architect.

Hardware schedule shall be submitted in the following format. Hardware schedules submitted to architect for review not in this format will be rejected:

HARDWARE SET 1

1 Sgl Door #001 Exterior from Corridor RHR 90 deg
Each leaf 3'0 x 7'0 x HMF x NLWD

Item, quantity, manufacturer's #, size, product type, finish, and product information

3 ea Hinge	BB1191 NRP 4.5 x 4.5	26D	HA
1 ea Cylinder	951 x GGMK	26D	FA
1 ea Exit Device	25R NL-OP	626	FA
Etc.			

1.04 QUALITY ASSURANCE

All hardware shall be furnished by an established Builders Hardware firm who maintains and operates an office, display, and stock in this area, and who is a regular authorized distributor of the lock they propose to furnish. All hardware schedules submitted for approval shall carry the signature and seal of a certified Architectural Hardware Consultant.

1.05 PROJECT CONDITIONS

Delivery storage and handling: Hardware supplier shall receive and check all hardware at his warehouse. Drop shipments to the jobsite from various manufacturers will not be permitted. All hardware shall be in its original packaging and plainly labeled and numbered to agree with the numbers and as listed in the hardware schedule. The contractor shall submit his schedules for approval to the architect before proceeding with any work. When required, hardware supplier shall deliver hardware and/or hardware templates to the various door manufacturers. The general contractor shall provide storage facilities for the finish hardware after delivery to the job site.

1.06 ITEMS NOT INCLUDED

Hardware for metal windows, toilet partitions, cabinets, access panels, etc. is not included in this section. See other sections for hardware to be furnished by others.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

Numbers given in this schedule are of the following manufacturers.

<u>PRODUCTS</u>	<u>MFG. SPECIFIED</u>	<u>APPROVED EQUAL</u>
Hinges	Ives	Hager, Bommer
Locks	Falcon	Schlage, Best
Exit Devices	Falcon	Von Duprin, Precision
Closers	LCN	Corbin-Russwin, Sargent
Trim/Auxiliary	Ives	Hager, Rockwood
Weather Strip	NGP	Pemko, Hager

2.02 HARDWARE FINISHES

US 32D	(630)	Hinges, Locks, Pivots, Bolts
US 32D	(630)	Push/Pulls, Exit Devices, Stops
Sprayed Aluminum		Door Closers
Aluminum		Thresholds

2.03 HINGES

Ball Bearing Hinges shall be five-knuckle construction. Hinges for exterior doors shall be stainless steel with non-removable pins, in the finish specified. Oil impregnated bearings are not an acceptable substitute for ball bearings. All hinges shall be 4 ½" x 4 ½", unless otherwise specified.

2.04 LOCKSETS

Furnish locksets and cylinders by same manufacturer. Cylinders shall be provided with small format interchangeable cores keyed to the owner's specifications. All lever locks shall be mortise or bored type as indicated. Lock bodies and lock trim shall be by the same manufacturer. Backset on all lever locks and deadlocks shall be 2 ¾" or 2 3/8" as required. All deadlocks shall have 1" throw bolts and be equipped with armor fronts. Trim for locksets shall be as indicated in the hardware sets. Locksets shall be ANSI/BHMA A156.2 series 4000 Grade 1 Cylindrical lock as scheduled.

2.05 EXIT DEVICES

Characteristics:

- a. Tested to be in accordance with ANSI A156.3, 1994, Grade 1. All exit devices to be heavy duty, with one-piece removable covers. The housing shall be manufactured from extruded aluminum without exposed screws or rivets.
 - b. Exit Devices shall be "UL" listed for Life Safety. All exit devices for fire-rated door openings shall have "UL" labels for "Fire Exit Hardware". All exit devices shall conform to NFPA 80 and NFPA 101 requirements.
 - c. All series exit devices shall be "touchpad" (modern) types, incorporating a hydraulic fluid damper, which decelerates the touchpad on its return stroke and eliminates noise associated with the exit device operation.
- All exit devices shall be non-handed. The touchpad shall extend a minimum of 1/2 of the door width and shall be a minimum of 2-3/16" in height. Plastic touch pads shall not be acceptable. The touchpad height shall exceed height of mechanism case or rail assembly to eliminate "Pinch Points". If the touchpad height does not exceed the height of the mechanism case or rail assembly, provide a factory installed insert / filler on the top and bottom of the touchpad along the mechanism case and rail assembly; to prevent "Pinch Points".

- d. All latch bolts to be the deadlocking type. Latch bolts shall have a self-lubricating coating to reduce wear. Plated or plastic coated latch bolts shall not be acceptable.
- e. All metal end caps to be standard with all exit devices.
- f. Exit device strikes, where surface applied, shall be a roller type and have an anti-slip mounting plate.
- g. All outside exit device trim shall be forged brass, full escutcheon. The pull shall have a grip that is 6 1/4" CTC and project 2 11/16".
- h. The exit device end caps shall be secured with three (3) screws to a truss bracket.
- i. The "touchpad" exit devices shall be patterned punched to designate code requirements; where required.
- j. All exit devices shall be made of brass, bronze, stainless steel, or aluminum material, plated to the standard architectural finishes to match the balance of the door hardware.
- k. Electric Latch retract options will require Power Supply from the same manufacturer.

2.06 CLOSERS

Door closers shall be full rack and pinion type. Closers shall be surface mounted. Equip closers with (2) two key operated regulating valves for individual control of both closing and latching speeds. Regulating valves shall be accessible from top of closer only and shall be completely unobtrusive. Closer shall have minimum of 15% door closing power adjustment and adjustable back check. Enclose closer in a cover of plastic. Closers on all exterior out-swinging doors and others as scheduled shall be parallel arm installation. Closer bodies and/or closer feet to be mounted on surface of door shall be supplied with sex bolts.

2.07 PUSH AND PULL UNITS

Push plates and pulls shall be solid stainless steel with a satin finish. Minimum thickness is .050; size and design are indicated in Hardware Sets.

2.08 PROTECTIVE PLATES

Kick, Armor, and Mop plates shall be height listed in schedule and width of 2" less than door width, or 1" less than door width of each leaf on pairs of doors. Plates shall be minimum thickness .050 stainless steel unless otherwise indicated.

2.09 THRESHOLDS

Provide (aluminum) thresholds where scheduled, with machine screws and lead expansion shields.

2.10 DOOR STOP

Provide door stops wherever necessary to prevent door or hardware from striking any adjacent partition or obstruction. Provide wall type whenever possible. All door stops and holders mounted on concrete floor or masonry walls shall have machine screws and lead expansion shields.

2.11 SILENCERS

Provide GJ-64 silencers for all hollow metal frames. Single doors shall have three (3) silencers. Double doors shall have two (2) silencers.

2.12 KEYING

Key locks to owner's specification. Obtain owners approval and signature on final approved keying. Perform all keying at lock factory, and register key data there. Deliver all master keys to Owner. No master keys shall be delivered to any other person.

PART 3 – EXECUTION

3.01 APPLICATION

INSTALLATION: Work shall be done by the **Hardware Supplier**, using skilled and experienced craftsman trained in the trade of installing finish hardware. Mortised items shall be neatly set in and made flush with door or frame surface. Manufacturer's instructions and recommendations shall be strictly followed.

FASTENERS: Hinges, pivots, locks, and exit devices shall be installed with proper sex bolts, wood or machine screws as supplied by the manufacturer. Surface closers shall be mounted to door with sex bolts. Door pulls shall be installed on doors with thru-bolts as supplied by manufacturer.

3.02 HARDWARE SETS

Hardware Set 1 Tag#1, 19

Continuous Hinges	112 HD
Concealed Vertical Rod	CD24C 718C
Concealed Vertical Rod	CD25C EO Inactive Leaf
Mortise Cylinder	C987
Rim Cylinder	C953
Offset Pull	8190-0
Closer	4040XP Cush 18PA, 30, 61
Threshold	By Aluminum Door Provider
Weather Strip	By Aluminum Door Provider
Door Sweep	By Aluminum Door Provider
Permanent Core	C607

Hardware Set 2 Tag#2, 10

Continuous Hinges	112 HD
Concealed Vertical Rod	CD24R 718C
Concealed Vertical Rod	CD25C EO Inactive Leaf
Mortise Cylinder	C987
Rim Cylinder	C953
Offset Pull	8190-0
Closer	4040XP Cush 18PA, 30, 61
Threshold	By Aluminum Door Provider
Weather Strip	By Aluminum Door Provider
Door Sweep	By Aluminum Door Provider
Permanent Core	C607

Hardware Set 3 Tag# 3A, 3B, 6

Ball Bearing Hinge	5BB1 NRP 630	
Concealed Vertical Rod	CD25C NL-OP	
Concealed Vertical Rod	CD25C EO Inactive Leaf	
Mortise Cylinder	C987	
Rim Cylinder	C953	
Offset Pull	8190-0	
Closer	4040XP	Cush
Threshold	425EV	
Weather Strip	160VA	
Door Sweep	97V	
Meeting Stile Astragal	115NA	
Permanent Core	C607	

Hardware Set 4 Tag# 9, 48

Ball Bearing Hinge	5BB1 NRP 630	
Flush Bolt	FB458-12 Top & Bottom	
Mortise Exit Device	25M-L	
Mortise Cylinder	C987	
Closer	4040XP	Cush Active Leaf
Surface Overhead Stop	454H	
Threshold	425EV	
Weather Strip	160VA	
Door Sweep	97V	
Meeting Stile Astragal	115NA	
Permanent Core	C607	

Hardware Set 5 Tag# 12, 13, 16, 17

Ball Bearing Hinge	5BB1 NRP 630	
Rim Exit Device	CD25R NL-OP	
Mortise Cylinder	C987	
Rim Cylinder	C953	
Offset Pull	8190-0	
Closer	4040XP	Cush
Threshold	425EV	
Weather Strip	160VA	
Door Sweep	97V	
Permanent Core	C607	

Hardware Set 6 Tag # 21, 25

Ball Bearing Hinge	5BB1	
Passage Latch	T101S Dane	
Closer	1461 R w/PA	
Kick Plate	8400 B-CS	10" x 2" LTDW
Wall Stop	407CVX	

Hardware Set 7 Tag #22, 27, 28, 29, 31A, 31B, 32, 33, 36, 37, 38, 40

Ball Bearing Hinge	5BB1	
Office Lockset	T511 BD Dane	
Kick Plate	8400 B-CS	10 x 2" LTDW
Wall Stop	407CVX	
Permanent Core	C607	

Hardware Set 8 Tag #23, 24

Ball Bearing Hinge	5BB1
Privacy Indicator	MA321 DGM
Closer	1461 R w/PA
Kick Plate	8400 B-CS 10" x 2" LTDW
Wall Stop	407CVX

Hardware Set 9 Tag # 26

Ball Bearing Hinge	5BB1
Passage Latch	T101S Dane
Kick Plate	8400 B-CS 10" x 2" LTDW
Wall Stop	407CVX

Hardware Set 10 Tag #30, 34, 35, 39, 42, 43A, 43B, 44A, 44B, 45, 46, 47

Ball Bearing Hinge	5BB1
Storeroom Lockset	T581 BD Dane
Closer	1461 R w/PA
Kick Plate	8400 B-CS 10 x 2" LTDW
Wall Stop	407CVX
Permanent Core	C607

Operational Intent: Classroom Doors are to be normally closed and locked.
Instructor to open door to allow students to enter. Door can also be opened via manual key from corridor side.

Hardware Set 11 Tag #41, 51

Ball Bearing Hinge	5BB1
Storeroom Lockset	T581 BD Dane
Closer	1461 R w/PA
Kick Plate	8400 B-CS 10 x 2" LTDW
Wall Stop	407CVX
Permanent Core	C607

Hardware Set 12 Tag# 50, 52

Ball Bearing Hinge	5BB1
Flush Bolt	FB458-12 Top & Bottom
Storeroom Lockset	T581 BD Dane
Surface Overhead Stop	454H Both leaves

Hardware Set 13 Tag# 49

Ball Bearing Hinge	5BB1
Concealed Vertical Rod	CD25C-L
Concealed Vertical Rod	CD25C-L
Mortise Cylinder	C987
Closer	4040XP Cush
Kick Plate	8400 B-CS 10 x 1" LTDW
Permanent Core	C607

End of Schedule

SECTION 08800 - GLASS AND GLAZING

PART 1 - SCOPE

- A. This Section includes all labor, materials, equipment and related items required for the work of glass and glazing as shown on the Drawings and specified herein.

PART 2 - SUBMITTALS

- A. The Contractor shall submit to the Architect for approval prior to furnishing materials at the job site, in five (5) copies, manufacturer's specifications, application and performance data, etc. for all glass and glazing materials, except miscellaneous accessories specified hereunder.
- B. Samples. The Contractor shall submit if requested to the Architect for approval prior to furnishing materials at the job site, duplicate samples of the following:
 - 1. Glass of each type, not less than 3" x 5".
 - 2. Glazing compound, one (1) cartridge.

PART 3 - CODES AND STANDARDS

- A. All glazing compounds and methods of glazing shall be in accordance with applicable portions of the Flat Glass Marketing Association's "Glazing Manual", latest edition.
- B. All safety glazing shall meet requirements of the Kentucky Department of Housing, Buildings, and Construction and appropriate Kentucky Revised Statutes.

PART 4 - PRODUCT HANDLING

- A. Glass shall be delivered to the job and shall be stored on end and under cover. Glass shall be properly crated, packaged, and protected from damage. Glazing compounds shall be delivered in manufacturer's sealed containers, with attached labels properly identifying the types.

PART 5 - MATERIALS

- A. Insulating glass for installation in aluminum windows shall be of sizes shown, composed of outer and inner panes of 1/4" (for color, see elevations) 1/4" clear .548, 1" O.A. , by LOF separated by a 1/2" dehydrated air space. Each unit shall be hermetically sealed and glass shall be separated by a spacer around the edges as standard with the manufacturer.
 - 1. Warranty. Each unit shall be guaranteed by the manufacturer not to develop, under normal conditions, material obstruction of vision as a result of film formation on the internal glass surfaces caused by failure of the hermetic seal other than through glass breakage for a period of ten (10) years.

- B. Compound for glazing in openings other than those which are dry-glazed shall be non-staining, one-part polysulfide base sealant, and shall be PRC "Rubber Caulk 5000", Pecora "Synthacalk GC-9", or DAP "Flexiseal". Color of compound shall be manufacturer's standard as selected by the Architect.
- C. Miscellaneous Items. Provide neoprene spacers, setting blocks, clips, and all accessories required for the work of glazing.
- D. Other material shall be as specified hereinafter.

PART 6 - GLAZING

- A. General Requirements:
 - 1. Glazing shall be done in a weathertight and waterproof manner. No glazing work shall be done when the temperature is below 40 degree F.
 - 2. Glazing surfaces shall be extremely clean, dry and completely dust free before commencing application of glazing materials.
 - 3. Remove glazing beads completely, perform glazing operations and set back in correct location. Do not mar beads, screws and the like.
 - 4. Glazing shall be done at the building after windows, frames, doors, etc. are installed.
 - 5. Remove excess glazing compound from glass and other adjacent surfaces to prevent permanent stains or other damage.
- B. Aluminum entrance doors and fixed window frames shall be glazed in strict accordance with entrance manufacturer's instructions and details for these operations.

PART 7 - CLEANING

- A. At completion, remove dirt, stains, etc. from glass. Wash and polish glass inside and outside surfaces. Exercise care so as not scratch or damage glass. Do not use acid solution or water containing caustic soaps. Leave work in perfect condition as approved by the Architect.

End of Section

SECTION 09260 - GYPSUM BOARD

PART 1 - GENERAL

1.01 SUMMARY

- A. Related Documents: Provisions established in General and Supplementary Conditions of the Contract, Division 1 General Requirements, and the Drawings are collectively applicable to this Section.
- B. Section Includes:
 - 1. Interior metal stud wall framing studs, 20 gage material thickness.
 - 2. Furred wall framing.
 - 3. Metal channel ceiling framing.
 - 4. Gypsum board.
 - 5. Cementitious backer board.
 - 6. Taped and sanded joint treatment.

1.02 SUBMITTALS

- A. Submit under provisions of Section 01330.
- B. Product Data: Provide data on metal framing, gypsum board, joint tape and joint compound.
- C. Submit manufacturer's installation instructions for each product proposed for use.

1.03 QUALITY ASSURANCE

- A. Perform Work in accordance with ASTM C 840, GA-201, GA-216 and GA-600.

1.04 DELIVERY, STORAGE, HANDLING

- A. Deliver, store, handle, and protect products in conformance with manufacturer's instructions and in accordance with Section 01600.
- B. Store inside building, on sleepers, and out of water.

1.05 QUALIFICATIONS

- A. Applicator: Company specializing in performing the work of this section with minimum of 3 years documented experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire rated assemblies.
- B. Refer to Drawings for details and references to UL and GA assemblies.

PART 2 - PRODUCTS

2.01 MANUFACTURERS - GYPSUM BOARD

- A. Acceptable Manufacturers: Subject to compliance with requirements indicated, provide products of one of the following:
 - 1. U. S. Gypsum.
 - 2. Georgia-Pacific Gypsum, LLC.
 - 3. National Gypsum.
 - 4. American Gypsum Co.
 - 5. Certainteed Corp.
- B. Substitutions: Under provisions of Section 01600.
- C. Specific product references are these of U.S. Gypsum Company unless noted otherwise as a standard of quality.

2.02 GYPSUM BOARD MATERIALS

- A. Fire Rated Gypsum Board: ASTM C 36; fire resistive type X or C, UL rated; 48 inch by 5/8 inch thick, maximum permissible length; ends square cut, tapered and beveled edges.
- B. Moisture Resistant Gypsum Board: ASTM C 630; 48 by 5/8-inch thick, type X or C (fire-rated), maximum permissible length ends square cut, tapered edges.
- C. Gypsum Backing Board: ASTM C 442; fire rated type 'X'; 5/8-inch thick; V-grooved edges, ends square cut, maximum permissible length.
- D. Abuse-Resistant Gypsum Board: ASTM C1629, medium duty 5/8-inch thick.
- E. Cementitious Backer Units: ANSI A118.9, ASTM C 1288 or ASTM C 1325, with manufacturer's standard edges. Thickness (as indicated).

2.03 MANUFACTURERS - FRAMING SYSTEMS

- A. Acceptable Manufacturers: Subject to compliance with requirements indicated, provide products of one of the following:
 - 1. Clark Steel Framing Systems, Inc., Hinckley, OH.
 - 2. Consolidated Systems, Inc., Columbia, SC
 - 3. Dale/Incor Industries, Dearborn, MI.
 - 4. Delta Metal Products, Dallas, TX.
 - 5. Dietrich Industries, Inc., Hutchins, TX.

6. Knorr Steel Framing Systems. Salem, OR.
 7. The Steel Network Inc., Raleigh, NC.
 8. Unimast, Inc., Houston, TX
- B. Substitutions: Under provisions of Section 01600.

2.04 FRAMING MATERIALS

- A. Studs and Tracks: ASTM C 645; galvanized sheet steel, gage as indicated on Drawings, 'ST' series shape, depths as indicated on Drawings. Provide with floor and ceiling runners, 'C' shaped galvanized, 1-1/4 inch leg.
- B. Shaft Wall Studs: Galvanized finish, length and depth as required, gage as recommended by manufacturer for heights encountered to maintain a maximum deflection of L/240 with 5 pound horizontal loading.
- C. Furring, Framing and Accessories: Provide in conformance with ASTM C 645, GA-216, and GA-600 and as follows:
1. Cold Rolled Channels: 3/4inch, 1-1/2 inch and 2 inches, 16 gage, prime painted.
 2. Furring Channels: 7/8 inch deep x 1-1/4 inch face, 25 gage, galvanized.
 3. Resilient Furring: 7/8 inch deep x 1-1/4 inch face, 25 gage, galvanized with one leg attached only.
- D. Fasteners: ASTM C 514 for nails and C 1002 for screws as follows:
1. Inserts, clips, bolts, nails or other screws as recommended by manufacturer, of type and size to suit application and to rigidly secure materials in place.
 2. Self-drilling, self-tapping bugle head screws for use with power drive tool.
 3. Metal Framing to Structure: Power driven screw fasteners to withstand 190 pound single shear resistance and 200 pound bearing force when drive through structural head or base and without exceeding allowable design stress in runner, fastener, or structural support.
 4. Metal to Metal: 3/8 inch, Type S or S-12, pan head screws.
 5. Gypsum Board to Sheet Metal Application: Type S screws.
 6. Gypsum Board to Gypsum Board Application: Type G screws.
 7. Vertical Deflection Connection (required under all steel beams where the top metal track is tied into the steel beam): Provide VertiClip® or VertiTrack™ deflection-accommodating anchorage devices, by The Steel Network Inc. Products shall conform to the following material properties and performance criteria:
 - a. Code Criteria:
 1. Meet required head of wall connection criteria as required by applicable referenced code for cyclic wall movement.
 - b. Material Composition: Meeting ASTM A653/A, SS grade 50, class 1, 50 ksi

minimum yield strength, 65 ksi minimum tensile strength, G-60 hot dipped galvanized coating.

- c. Material Thickness: 0.036 inch thick for VertiClip SLD series.
- d. Clips shall be designed for positive attachment to structure and stud web using step-bushing technology to provide frictionless vertical movement.
- e. Provide clips with attached bushing and screw of the series, size, and configuration as recommended by manufacturer.
- f. Friction-fit deep-leg track assemblies and tracks relying on steel flexure to perform are unacceptable.
- g. Substitutions: Must comply with the following:
 - 1. Meets ASTM A653/A, SS Grade 50, class 1 50 ksi minimum yield strength, 65 ksi minimum tensile strength, G-60 hot dipped galvanized coating.
 - 2. Certified for use in UL 2079-approved assemblies for cyclic movement.
 - 3. Structural testing performed per AISI requirements.

2.05 ACCESSORIES

A. U. S. Gypsum Company products specified below as a standard of quality, unless noted otherwise.

- 1. Acoustical Insulation: Refer to Section 07210.
- 2. Acoustical Sealant and Tape: Non-hardening, non- skinning, for use in conjunction with gypsum board; manufactured by Tremco, Pecora, or USG.
- 3. Corner Beads: Metal, equal to USG Durabead No. 103, galvanized.
- 4. Casing Beads: Equal to USG No. 200-A, galvanized. 5.
- 5. Control Joint: Equal to USG No. 093, galvanized.
- 6. Hanger Wire: Annealed galvanized wire, of gauges indicated (or required to suit application) to rigidly support ceiling components in place.

B. Joint Treatment and Texture Materials

- 1. Joint Tape:
 - a. ASTM C 475 or FS SS-J-570, Type II, perforated tape.
 - b. Joint compound:
 - 1. ASTM C 475 or FS SS-J-570, Type I.
 - 2. Acceptable Product:
 - i) Taping compound: USG Durabond Joint Compound Taping.
 - ii) Topping: USG Joint Compound-All Purpose.

C. Reveal Moldings

1. Extruded aluminum, 6063 T5 alloy, clear anodized unless otherwise noted, in profiles as indicated on the Drawings, as made by Pittcon or Fry Reglet.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that site conditions are ready to receive work and opening dimensions are as indicated on shop drawings and instructed by the manufacturer.
- B. Beginning of installation means acceptance of existing substrate.

3.02 METAL STUD INSTALLATION

- A. Follow recommendations of U.S. Gypsum Co., "Gypsum Construction Handbook".
- B. Install studding in accordance with ASTM C 754, GA-201, GA- 216, and GA-600.
- C. Metal Stud Spacing: 16 inches on center, unless otherwise noted in schedule or on Drawings. Locate studs maximum of 2 inches from door frames, abutting partitions, corners, and other construction features.
- D. Stud to Structure: Refer to Drawings for indication of partitions extending stud framing through the ceiling to the structure above. Provide vertical deflection accommodating devices where each stud connects to structural members above.
- E. Stud to Ceiling: Refer to Drawings for indication of partitions extending to finished ceiling only and for partitions extending through the ceiling to the structure above.
- F. Door Opening Framing: Install double studs at door frame jambs. Install stud tracks on each side of opening, at frame head height, and between studs and adjacent studs.
- G. Blocking: Screw wood blocking to studs. Bolt or screw steel channels to studs. Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, shelving, toilet accessories, and hardware.
- H. Coordinate installation of bucks, anchors, blocking, electrical and mechanical work placed in or behind partition framing.
- I. Stud Connections: Secure studs to runners with screws at door and window frames, partition intersections and corners. Where required for additional height, splice studs by nesting a minimum lap of 18 inches and attach flanges together with 2 screws in each flange. Prevent structural loading of stud systems.

- J. Restroom Chase Wall Studs: Position double row of studs vertically in runners so that studs are opposite each other in pairs with flanges pointed in same direction. Space at 16 inches on center unless otherwise noted. Anchor each stud to runner flanges with screws. Cross brace between rows of studs with wallboard, 12 inches by chase width, screw attached to stud webs at quarter points in partition height, with 1 inch screws spaced 8" off center in each stud web.
- K. Seismic Requirements: Provide lateral bracing and other measures in accordance with seismic requirements of applicable codes and regulations.

3.03 WALL FURRING INSTALLATION

- A. Erect wall furring for direct attachment to concrete block and concrete walls.
- B. Erect furring channels vertically. Secure in place on alternate channel flanges at maximum 24 inches on center.
- C. Space furring channels maximum 16 inches off center, not more than 4 inches from floor, ceiling lines and abutting walls.
- D. Erect free-standing metal stud framing tight to concrete and concrete masonry walls, attached by adjustable furring brackets in accordance with manufacturer's instructions.

3.04 FURRING FOR FIRE RATINGS

- A. Install furring as required for fire resistance ratings indicated.

3.05 SHAFT WALL INSTALLATION

- A. Shaftwall Framing: In accordance with manufacturer's installation instructions. Space studs at 16 inches on center. Cut so that studs are no more than 1/2 inch shorter than rough opening.

3.06 CEILING FRAMING INSTALLATION

- A. Install in accordance with ASTM C 754, GA-201, GA-216, and GA-600 and manufacturer's instructions.
- B. Coordinate location of hangers with other work. Use 9 gage wire for single layer wall board, and 8 gage wire for double layer. Space at maximum 48 inches on center each way, unless ceiling framing occurs at more frequent intervals.
- C. Install ceiling framing independent of walls, columns, and above-ceiling work. Locate members within 6 inches of walls. Unless shown otherwise, use 1-1/2 inch cold-rolled channels, 2 inch on double layer board, at 48 inches off center main framing with furring channels at 24 inches on center, 16 inches on center for double layer board.

- D. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing. Extend bracing minimum 24 inches past each end of openings.
- E. Laterally brace entire suspension system.

3.07 ACOUSTICAL ACCESSORIES INSTALLATION

- A. Install resilient channels at maximum 24 inches on center. Locate joints over framing members.
- B. Place acoustical insulation in partitions tight within spaces, around cut openings, behind and around electrical and mechanical items within or behind partitions, and tight to items passing through partitions.
- C. Install acoustical sealant at wall perimeter of designated partitions as follows:
 - 1. Metal Framing: Two beads at contact area at intersecting walls, floors and ceilings.
 - 2. Base Layer Gypsum Board: One bead.
 - 3. Seal penetrations of partitions by conduit, pipe, ductwork, rough-in boxes, and access door frames.

3.08 GYPSUM BOARD INSTALLATION

- A. Install gypsum board in accordance with GA 201, GA 216, GA-600 and U.S.G. "Gypsum Construction Handbook".
- B. Erect interior board horizontally if space is small so as to avoid end butt joint; otherwise install gypsum board vertically, with ends and edges occurring over firm bearing. Stagger end joints to occur at different locations on opposite sides of wall. Apply board to suspended ceilings with long dimension at right angles to framing.
- C. Erect exterior gypsum sheathing horizontally, with edges butted tight and ends occurring over firm bearing. Abut boards without forcing. Neatly fit ends and edges of boards and make cuts and penetrations so that paper facing and gypsum core are not damaged.
- D. Use screws when fastening gypsum board to metal furring or framing and nails to wood studding. Stagger fasteners opposite each other on adjacent ends and edges. Space fasteners as recommended in U.S.G., "Gypsum Construction Handbook". Do not attach gypsum board to top track on partitions extending from floor to structure above.
- E. Treat cut edges and holes in moisture resistant gypsum board and exterior gypsum ceiling board with sealant.

- F. Place control joints at changes in back-up material, at maximum 20'-0" off center in exterior walls , and at maximum 30'- 0" off center at interior partitions. In ceilings, install at maximum 30'-0" off center each way. Provide fire resistant protections behind control joints in fire rated assemblies.
- G. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.
- H. On fire rated assemblies, seal penetrations and make air-tight. Refer to Section 07840 for firestopping requirements and materials.
- I. Thicken partitions to eliminate wall surface jogs for the full length of the wall within a room to conceal structural members, pipes, panels, specialty items, and accessories.
- J. Coordinate door and other frame thicknesses as required.

3.09 JOINT TREATMENT

- A. Tape, fill, and sand exposed joints, edges, and corners to produce surface ready to receive finishes. The intent is to provide the highest quality of joint treatment work consistent with commercial construction. Leave surfaces smooth, uniform, and free of fins, depressions, ridges, cracks, and other imperfections.
- B. Feather coats onto adjoining surfaces so that camber is maximum 1/32 inch.
- C. Levels of Finish:
 - 1. Comply with GA-214; italicized commentary is excluded; replace words "may" and "should" with "shall."
 - 2. Locations to receive Level 4 finish: Areas to be painted.
 - 3. Locations to receive Level 3 finish: Areas to receive moisture resistant gypsum board used as a tile substrate.
 - 4. Locations to receive Level 2 finish: Fire-rated, sound-rated, and smoke-rated assemblies in ceiling plenums and concealed areas.
 - 5. Locations to receive Level 1 finish: Non-fire-rated, non-sound-rated, and non-smoke-rated assemblies in ceiling plenums and concealed areas.

3.10 TOLERANCES

- A. Maximum Variation from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09300 - CERAMIC TILE

PART 1 – GENERAL

1.1 DESCRIPTION

A. Furnish all labor, materials, tools, equipment and services necessary for and reasonably incidental to complete the tile work as shown on the drawings or specified.

B. Related documents, drawings and general provisions of contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to work of this section.

C. Related Sections

1. Division 7, sealing expansion joints and other joints in tile work (joint sealant types, colors and manufacturers to be specified by Architect).
2. Division 3, Concrete. 03300

1.2 REFERENCE STANDARDS

Comply with current editions and applicable Specifications of the following:

1. American Society for Testing and Materials (ASTM).
2. American National Standards Institute (ANSI).
3. Tile Council of North America (TCNA) Handbook for Ceramic Tile Installation.

1.3 QUALITY ASSURANCE

A. Provide tile materials of each type, color and finish as indicated on Finish Schedule in architectural drawings.

B. Deliver, store and handle materials in accordance with manufacturer's instructions.

C. Tile contractor, by commencing the work of this section, assumes overall responsibility to assure that all assemblies, components and parts shown or required within the work of this section comply with contract documents and are compatible with each other and with the conditions and expected use.

D. Qualified Labor: Engage an installer with a minimum of five (5) years experience with commercial tile installations similar in material, design and scope to that indicated.

- E. Extra Stock: Furnish extra stock of quantity equal to 5% of amount installed, in full-size units, for each type, color, size and finish of tile.

1.4 SUBMITTALS

- A. Verification Samples: Submit the following for each type, color, size, and finish included in the work.

- 1. Full size tile and trim shapes.
- 2. Grout color samples.
- 3. Sealant color samples or Prefabricated Joint/Transition Strip Samples

- B. Product and Installation Data:

- 1. Porcelain tile manufacturer's product and technical data indicating compliance with applicable standards.
- 2. Master Grade Certificates for each type of tile issued by tile manufacturer and signed by the installer, only available after the material has shipped from the manufacturer.
- 3. Mortar and grout manufacturer's technical data sheets indicating suitability for the installation specified and compliance with applicable standards.
- 3. Sealant or prefabricated joint manufacturer's product and technical data.

1.5 ENVIRONMENTAL

- A. Comply with requirements of referenced standards and recommendations of material manufacturers for environmental conditions before, during and after installation.
- B. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.
- C. Maintain minimum and maximum temperature limits as recommended by manufacturers.
- D. Protect adjacent surfaces during progress of the work in this section.

- E. Illuminate the work area during installation providing the same level and angle of illumination as will be available for final inspection. The use grazing or cove type lighting where lights are located either at the wall/ceiling interface, or mounted directly to the wall prompts the light to strike the tile finish at a straight down angle, creating unwanted shadows from grout lines giving the tile layout an un-flat irregular appearance. Installing overhead lighting at a wide downward angle 18"-24" away from the tiled wall will provide a flatter more uniform appearance to the tiled surface.

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Furnish tile complying with "Standard/First Grade" requirements per ANSI A137.1 - 2012, for
types of tile indicated.
- B. Comply with ANSI Standard for Tile Installation Material and current Tile Council of North America (TCNA) Handbook for products and materials indicated for setting and grouting.

2.2 TILE

- A. Unglazed and glazed porcelain tile shall be of style, color, size and finish as listed in Finish Schedule on Architectural Drawings, and shall conform to the requirements of ANSI A137.1

2.3 SETTING AND GROUTING MATERIALS

- A. Use appropriate installation mortars according to ANSI A118-2014.
- B. Grouting Materials: Select grouting materials according to the following types: Tile setting and grouting epoxy: A118.6-2010 Standard Cement Grout, A118.7-2010, High Performance Cement Grout or A118.8-2010, Modified Epoxy Emulsion Grout. Provide grout in colors selected by the Architect from standard colors available from the approved manufacturers.
- C. Use waterproofing/Anti Fracture Membrane as required according to ANSI A118.12.

2.4 EXPANSION JOINTS, CONTROL, CONTRACTION, AND ISOLATION JOINTS

- A. Refer to most current TCNA Handbook, Method EJ171 for recommendations on locating, treating and detailing various types of construction joints.
- B. Use sealant complying with ASTM C920 according to Type, Grade, Class and Uses required.
- B. Prefabricated expansion joints can also be used when suitable for installation.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine substrates where tile will be installed for compliance with requirements for installation tolerances and other conditions effecting performance of installed tile. Before tiling concrete surfaces saturated dry (SSD), free of standing water verify that substrates for setting tile are well cured, structurally sound dry, clean, and free from oil or waxy films, curing compounds or other coatings and surface treatments. Nonstructural shrinkage cracks should be pretreated with a crack suppression membrane (to prevent telegraphing of cracks through the finished tile installation) ANSI A118.12.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected. Commencement of work signifies acceptance of substrate and installation conditions.

3.2 PREPARATION

- A. Substrate Preparation: Prepare and clean substrate in accordance with installation standards and manufacturer's instructions, and as follows:
 - 1. Remove protrusions, bumps and ridges by grinding or chipping.
 - 2. Repair, fill, and level cracks, holes, depressions and rough or chipped areas in substrate using patching material recommended by setting materials manufacturer.
 - 3. Slab to have light broom finish when tile is installed by thin-set method.
 - 4. Before tiling, verify that all surfaces to be tiled are structurally sound true to plane, and fall within maximum variations shown below: Ensure that the substrate is within the following tolerances:

- a. Horizontal surfaces (floors) - Maximum variation in substrate shall not exceed 1/4 " in ten feet* from required plane, depending on substrate.
- b. Vertical surfaces (walls) - Maximum variation in substrate shall not exceed 1/4 " in ten feet* from the required plane, depending on substrate.

* When using large format defined by TCNA Handbook as tiles with at least one edge 15" in length or greater; a more stringent tolerance 1/8" in 10' or 1/16" in 24" when measure from the high points on the surface is required.

Report all unacceptable surfaces to the architect in writing, and do not tile such surfaces until they are leveled enough to meet above requirements.

- B. Jobsite Blending: Blend tiles before installing in accordance with reference standards to produce an even range and distribution of color and finish.

3.3 INSTALLATION

- A. Manufacturers' Instructions: Perform work in compliance with standard accepted installation guidelines, manufacturer's instructions and setting materials manufacturers' instructions.
- B. Comply with appropriate ANSI A108-2014 specification and current Tile Council of North America Handbook (TCNA) for appropriate method of installation for each specification. For thin set adhesive mortar application use following technique:
 - With the flat side of trowel, key mortar into substrate.
 - Using the appropriate size trowel, comb mortar in one direction with notched side of the trowel.
 - Set tile with a sliding motion, perpendicular to the mortar ridges.
 - Obtain as near 100% coverage as possible of mortar to tile.
 - Mortar coverage shall be no less than 85% and shall be sufficiently distributed to give full support under all corners and edges of the tile.
 - Note: 95-100% coverage is mandatory for wet and exterior areas. Periodically, remove sheets or individual tiles to assure proper bond coverage consistent with industry specifications.
- C. Installing Tile:
 - 1. Install tile in pattern indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Adjust to minimize tile cutting and to avoid tile less than half size.

2. When possible, smooth cut edges of tile and/or use appropriate cutter or wet saw to produce smooth cuts. Provide straight cuts which align with adjacent materials.
3. Extend tile into recesses and under equipment and fixtures to form a complete covering without interruption.
4. Terminate tile neatly at obstructions, edges, and corners, without disruption of pattern or joint alignment.
5. Provide tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints smooth and even, without voids, cracks, or excess mortar or grout.
6. Mix mortar in strict accordance with manufacturer's recommendations.
7. Apply setting material in accordance with manufacturer's directions and install tile before mortar has started initial cure. For thin set mortar application, use a notch trowel that will achieve the recommended coverage of mortar after tiles have been installed. Reference standard coverage information and follow manufacturer's recommendations for trowel size when using mortar.
8. Do not spread more material than can be covered within 10 to 15 minutes. If "skinning" occurs, remove mortar and spread fresh material. Spread mortar with notches running in one direction that shall be perpendicular to the pressing, pushing and pulling of tile during placement.
9. Place tile in fresh mortar, press, push and pull the tile slightly to achieve as near 100% coverage and contact of tile with setting material and substrate as possible. The coverage shall be no less than 85% and be sufficiently distributed to give full support of the tile. Make sure that all corners and edges are well supported with mortar. Leave no hollow corners or edges. NOTE: 95-100% coverage is mandatory for wet or exterior areas. A skim coat ("back-butter") of mortar can be placed onto the entire back of the tile using a trowel in order to assist in optimum adhesion and coverage of the mortar being used.
10. Ensure there is a minimum 1/8" of mortar between tile and substrate after proper bedding. Installer must periodically remove sheets or individual tiles to assure proper bond coverage consistent with industry specifications. If coverage is found to be insufficient, use a larger size notch trowel.
11. Use a beating block and hammer or rubber mallet so that faces and edges of individual tiles are flush and level with faces and edges of adjacent tiles, and to reduce lippage.
12. For running bond/brick joint patterns utilizing tiles (square or rectangular) where the side being offset is greater than 18" (nominal dimension), the running bond

offset will be a maximum of 33% unless otherwise specified by the tile manufacturer. If an offset greater than 33% is specified, specifier and owner must approve mock-up and lippage.

D. Grouting:

1. Install grout in accordance with ANSI A108.10, A108.6, A108.8, A108.9-2010 correlating to grout type chosen and manufacturer's recommendations.
2. Mix grout material in strict accordance with manufacturer's directions.
3. Apply grout to produce full, smooth grout joints of uniform width, and free of voids and gaps.
4. Before grouting entire area do a test area to assure there will be no permanent staining or discoloration of the tile and to verify that the grout is easily removed from the surface. If necessary, pre-coat exposed surfaces of tile with a grout release as recommended by the manufacturer, as this will facilitate removal of the grout.
5. Cure all setting and grouting materials in accordance with manufacturer's recommendations.

E. Cleaning and Protection:

1. If one has been used, remove grout release and clean tile surfaces so they are free of grout residue and foreign matter, in accordance with manufacturer's instructions. If a grout haze or residue remains, use a suitable grout haze remover or cleaner and contact grout manufacturer for recommendations. Flush surface with clean water before and after cleaning. Do not use harsh hydrochloric, muriatic or sulfuric acid or acid-based cleaners to clean glazed tiles or tiles grouted with latex modified grout.
2. When a heavy residue of Portland cement grout is present, acceptable tile cleaning acids may be used. However, the grout should be allowed to cure a minimum of 10 days before this aggressive cleaning method is employed. Tile and grout shall be soaked with water before cleaning. In the absence of a recommendation from the grout manufacturer, acid cleaning may be done with a saturated solution of phosphoric or sulfamic acid, mixed in accordance with manufacturer's recommendations.
3. Protect all floor tile installations with clean construction paper or other heavy covering during construction period to prevent staining or damage. After cleaning,

provide protective covering and maintain conditions to protect tile work from damage or deterioration. Where tiled surfaces will be subject to equipment or wheel traffic or heavy construction traffic, and during move-in of furniture and equipment, cover protective covering with 1/4" hardboard, plywood or similar material. No foot or wheel traffic permitted on floor for at least 3 days after grouting. Owner/specifier is responsible for protecting tile from damage including allowing sufficient time for installed materials to cure properly typically 30-45 days is required for full cure of thin set bonding mortars.

4. Leave finished installation clean and free of cracked, chipped, broken, un-bonded, and otherwise defective tile work.

END OF SECTION

SECTION 09511 - SUSPENDED ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.01 Work Included

- A. Suspended metal grid ceiling system.
- B. Acoustical tile panels.

1.02 Related Work

- A. Air diffusion devices in ceiling system.
- B. Light fixtures in ceiling system.

1.03 References

- A. ASTM C635 - Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
- B. ASTM C636 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
- C. UL - Underwriter's Laboratories System Ratings.

1.04 Quality Assurance

- A. Manufacturer: Company specializing in the manufacture of ceiling suspension system and ceiling tile panels, three years minimum experience.
- B. Installer: Company shall have experience installing the approved manufacturer.

1.05 Regulatory Requirements

- A. Conform to applicable code for fire rated assembly where required.

1.06 Submittals

- A. Submit shop drawings and product data for review.
- B. Indicate on shop drawings, grid layout and related dimensioning, junctions with other work or ceiling finishes, interrelation of mechanical and electrical items related to system.
- C. Provide product data on metal grid system components, and acoustic units.
- D. Submit samples to Owner and Architect for review.
- E. Submit manufacturer's installation instruction.

1.07 Environmental Requirements

- A. Maintain uniform temperature of minimum 60 degree F (16 degrees C), and humidity of 20 to 40 percent prior to, during, and after installation.

1.08 Sequencing/Scheduling

- A. Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, dust generating activities have terminated and overhead work is completed, tested, and approved.
- B. Schedule installation of acoustic units after interior work is dry.

1.09 Extra Stock

- A. Provide one carton [of each type used] extra tile panels to Owner.

PART 2 - PRODUCTS

2.01 Manufacturer - Suspension System

- A. Suspension system shall be from the same manufacturer as acoustic units.

2.02 Suspension System

- A. Armstrong "15/16" Prelude ML" exposed tee system for square lay-in units, or an approved equal.
- B. Grid Finish: White
- C. Support Channels and Hangers: Size and type to suit application, to rigidly secure acoustic ceiling system including integral mechanical electrical components with maximum deflection of 1/360.

2.03 Acoustic Units

- A. Armstrong "Fine Fissured – High NRC" #1754, 24"x24"x7/8", square lay-in, color: white, USG, CertainTeed or approved equal.
- B. Armstrong "Fine Fissured" #1728, 24"x24"x5/8", square lay-in, color: white, USG, CertainTeed or approved equal.

PART 3 - EXECUTION

3.01 Inspection

- A. Verify that existing conditions are ready to receive work.
- B. Verify that layout of hangers will not interfere with other work.
- C. Beginning of installation means acceptance of existing conditions.

3.02 Installation

- A. Install system in accordance with ASTM C636 manufacturer's instructions and as supplemented in this Section.
- B. Install system capable of supporting imposed loads to a deflection of 1/360 maximum.
- C. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.
- D. Supply hangers or inserts for installation of mechanical and electrical if metal deck is not supplied with hanger tabs, coordinate the installation of hanger clips during steel deck erection. Provide additional hangers and inserts as required.
- E. Hang system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers (and related carrying channels) to span the extra distance.
- G. Center system on room axis leaving equal border units, unless otherwise directed by reflected ceiling plan.
- H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- I. Do not eccentrically load systems, or produce rotation of runners.
- J. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. Provide edge moldings at junctions with other interruptions.
- K. Form expansion joints as required.

L. Fit acoustic units in place, free from damaged edges or other defects detrimental to appearance and function.

M. Install acoustic units level, in uniform plane, and free from twist, warp and dents.

3.03 Tolerances

A. Variation from flat and level surface: 1/8 inch in 10 ft.

End of Section

SECTION 09650 - RESILIENT FLOORING

PART 1 - GENERAL

1.01 SUMMARY

- A. Extent of resilient flooring and accessories as shown on Drawings and Specified herein.

Work includes:

1. Vinyl Cove Base
2. Resilient Edge Strips

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data and installation instructions for resilient flooring and accessories in accordance with Section 01300.
- B. Samples: Submit, for verification purposes, samples of each type, color and pattern of resilient flooring and accessory required, indicating full range of color/pattern variation.
- C. Maintenance Instructions: Submit copies of manufacturer's recommended maintenance practices for each type of resilient flooring required to Owner.

1.03 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of standard quality of manufacturers as specified. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

Refer to Finish Schedule on Drawings for styles and colors of specified materials.

- A. Vinyl Cove Base, 4" or 6" high x .080 thickness set-on type, as manufactured by Johnsonite, Mannington, or approved equal, and furnished in 120' long rolls meeting the requirements of ASTM F1861, Type TV, Group 1 and ASTM E-648/NFPA 253, Class 1.
- B. Resilient Edge Strips: ADA compliant, homogeneous vinyl or rubber transition strips as required where change of flooring types occur. Color to match flooring or as selected by Architect from standard colors available.
- C. Adhesives: As recommended by flooring manufacturer to suit material and substrate conditions.

- D. Concrete Slab Primer: Non-staining type as recommended by flooring manufacturer.
- E. Leveling Compound: As recommended by flooring manufacturer.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Make a thorough examination of surfaces to receive resilient flooring. If surfaces are defective and will not permit a proper finished installation, immediately notify the Architect in writing, or assume responsibility for and rectify any resulting unsatisfactory condition.
- B. Inspect floor for holes, cracks and smoothness. Test for dryness. Do not proceed with laying until subfloors are dry and smooth, holes and cracks filled.

3.02 PROJECT CONDITIONS

- A. Substrate Conditions: The installer shall verify in writing to the Owner, a minimum of 30 days prior to scheduled resilient flooring installation, the following substrate conditions:
 - 1. Moisture: Initial emission rate, as tested with a calcium chloride test kit.
 - 2. Alkalinity: pH range of 6-8. Must not exceed pH of 10.
- B. After application (by others) of the concrete sealer, the installer shall perform a second calcium chloride test. These second test results will be compared with the previous results. Final results shall not exceed resilient flooring manufacturer's allowable emission rate.
- C. Maintain minimum temperature of 68°F (20°C) in spaces to receive resilient flooring for at least 72 hours prior to installation, during installation and for not less than 48 hours after installation. Subsequently, maintain minimum temperature of 68°F in areas where work is completed.
- D. Install resilient flooring and accessories after they have the same temperature as the space and after other finishing operations, including painting, have been completed. Moisture content and alkalinity level of concrete slabs, as well as environmental conditions, must be within limits recommended by manufacturer of products being installed.

3.03 PREPARATION

- A. Broom clean or vacuum surfaces to be covered, and inspect subfloor. Start of flooring installation indicates acceptance of subfloor conditions and full responsibility for completed work.
- B. Use leveling compound as recommended by flooring manufacturer for filling small cracks, holes and depressions in subfloor.

- C. Perform moisture tests on concrete slabs to determine that concrete surfaces are sufficiently cured dry as well as to ascertain presence of curing compounds, and ready to receive flooring.
- D. Apply concrete slab primer, if recommended by flooring manufacturer, prior to application of adhesive. Apply in compliance with manufacturer's directions.

3.04 INSTALLATION

- A. Place flooring with adhesive cement in strict compliance with manufacturer's recommendations. Butt tightly to vertical surfaces, thresholds, nosings, and edgings. Scribe around obstructions to produce neat joints, laid tight, even, and straight. Extend flooring into toe spaces, door reveals, and into closet and similar openings.
- B. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent-marking device.
- C. Install flooring on covers for telephone and electrical ducts, and other such items as occur within finished floor areas.
- D. Maintain overall continuity of color and pattern with pieces of flooring installed in these covers. Tightly cement edges to perimeter of floor around covers and to covers.
- E. Tightly cement flooring to subbase without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections. Hand roll flooring at perimeter for each covered area to assure adhesion.
- F. Tile Floors
 - 1. Lay tile from center marks established with principal walls, discounting minor offsets, so that tile at opposite edges of room are of equal width. Adjust as necessary to avoid use of cut widths less than $\frac{1}{2}$ tile at room perimeters.
 - a. Lay tile square to room axis, unless otherwise shown.
 - b. Lay tile in "checkerboard" fashion with grain quarter-turned in adjacent tiles unless recommended otherwise by manufacturer.
 - c. Follow Floor Tile Patterns as indicated on Drawings where required.
 - 2. Match tile for color and pattern by using tile from cartons in same sequence as manufactured and packaged if so numbered. Cut tile neatly around all fixtures. Broken, cracked, chipped or deformed tiles are not acceptable.
 - 3. Adhere tile flooring to substrates using full spread of adhesive applied in accordance with flooring manufacturer's recommendations.

G. Accessories: Apply resilient base to walls, columns, pilasters, casework and other permanent fixtures in rooms or areas where base is required. Install base in lengths as long as practicable, with preformed corner units or fabricated from base materials with mitered or coped inside corners. Tightly bond base to backing throughout length of each piece, with continuous contact at horizontal and vertical surfaces.

1. On masonry surfaces or other similar irregular surfaces, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
2. Place resilient edge strips tightly butted to flooring and secure with adhesive. Install edging strips at edges of flooring which would otherwise be exposed.

3.05 CLEANING AND PROTECTION

A. Immediately upon completion of the resilient flooring remove any excess adhesive or other surface blemishes, using neutral type cleaners as recommended by flooring manufacturer.

1. Do not wash or machine scrub linoleum for at least 3-5 days after installation.
2. Do not strip factory finish from linoleum sheet flooring per Manufacturer recommendations.

B. Protect installed flooring with heavy Kraft paper or other covering.

C. Finishing: After completion of project and just prior to final inspection of work, thoroughly clean all floors and accessories.

1. Apply waxes to vinyl composition tile flooring, where applicable, as recommended by the Manufacturer (2 coats minimum) and buff prior to Owner's occupancy and/or final completion of the project.

3.06 EXTRA STOCK

A. Provide the Owner with the following: one (1) unopened carton of each tile selection specified on this project.

End of Section

SECTION 09681 - MODULAR CARPET

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Carpet Tile as specified on the drawings.
 - 1. Moldings, adhesives cements for glued-down installation.
- B. Specified in Other Sections:
 - 1. Wall Base.
 - 2. Transition edges

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's complete technical product data for each type of edge trim, tack strip, cement and adhesive types and other related materials necessary to complete the installation.
- B. Submit carpet samples for verification of color and patterns:

1.03 QUALITY ASSURANCE

- A. Products and methods of installation specified herein are compatible with and approved by carpet manufacturer.
- B. General Terminology/Information Standard: Carpet and Rug Institute's "Carpet Specifier's Handbook".
- C. Flame/Smoke Resistance Standards: Provide materials meeting the following test rating standards as required Building Code Requirements.
 - 1. Pill Test: ASTM D 2859, or DOC FF-1-70.
 - 2. Floor Radiant Panel Test: ASTM E 648, with minimum average radiant flux ratings not less than 0.22 watts/sq. cm.
 - 3. Smoke Density Test: ASTM E 662 or NFPA No. 258 rating within limit required by governing regulation.

1.04 PRODUCT HANDLING

- A. Contractor is responsible for receiving and handling, on-site, all carpet materials furnished by Owner.
 - 1. For each material delivery, the Contractor shall fill out receiving reports furnished by Owner. Each delivery shall be inspected for damage. All damage shall be noted on the carrier's delivery slips and shall be forwarded to the Construction Manager immediately upon receipt of delivery. If damaged material is not reported when

discovered, the Contractor assumes full responsibility.

- B. Storage areas shall be secure and dry with temperatures maintained above 65°F at all times.

1.05 PROJECT CONDITIONS

- A. Coordination: Coordinate this Work with the Work of other Sections to avoid any delay or interference with other Work.
- B. Maintain 70°F. during and 24 hours before and after installation. Maintain temperature of 55°F and a relative humidity range of 35% to 50% in completed areas.
- C. Notify Construction Manager of any defects, mismarking or evidence of damage to carpet materials or appearance of moisture, mildew or fungus.

1.06 WARRANTY

- A. Warrant carpet installation for one year from opening date of facility from becoming unserviceable or causing an objectionable appearance resulting from defects such as:
 - 1. Release from the substrate.
 - 2. Bunching and rippling.
 - 3. Opening of seams.

1.07 MAINTENANCE MATERIALS

- A. Deliver 20 carpet squares of each carpet type to Owner at completion of installation for his reserve supply. In addition, save squares over 1/2 square in size for the Owner's reserve.

PART 2 - PRODUCTS

2.01 ACCEPTABLE PRODUCTS

- A. Carpet Tile: See Architectural drawings Finish Schedule for materials to be provided.

2.02 CARPET ACCESSORIES

- A. Adhesive:
 - 1. Water resistant, non-staining type meeting flammability requirements for installed carpet.
 - 2. Acceptable Products: Adhesive as recommended by Manufacturer of modular carpet tiles.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Repair minor holes, cracks, depressions and rough areas using material recommended by carpet and adhesive manufacturer. Remove contaminants and dirt. Prepare floor as recommended by carpet manufacturer. Leave floor clean and dry.

3.02 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations for joint locations and carpet direction. Maintain uniformity of carpet direction and lay of pile. Center joints at door openings.
- B. Extend carpet under open-bottomed obstructions and under removable flanges and furnishings, and into alcoves and offsets of each space.
 - 1. Install edge guard with epoxy where carpet ends against other materials. Center edge guard under doors in door openings.
- C. Provide cutouts where required. Install edge guards where edge of carpet is exposed.

3.03 GLUE-DOWN INSTALLATION

- A. Test substrate to demonstrate effectiveness of adhesive. Remove sample demonstrating procedure to minimize damage to carpet. Apply primer to entire substrate as necessary for adequate bond of carpet.
- B. Layout carpet tile prior to adhering. Maintain straight joints, true with lines of building. Except where patterns are indicated, install carpet squares centered in space in both directions. However, no edge tiles shall be cut to less than 1/2 of their width. Carpet tiles shall be laid with 5 adhesive spots per tile. Unless otherwise indicated, install tiles with the nap all running in the same direction.
- C. Securing base of pile at cut edges with seaming cement without evidence on carpet face.
- D. Apply adhesive to substrate in accordance with manufacturer's instructions. Butt carpet edges tightly together to form joints without gaps. Roll lightly to eliminate air pockets and ensure uniform total-area bond of carpet to substrate. Remove adhesive (if any appears) promptly from face of installed carpet.

3.04 SUBSEQUENT OPERATIONS

- A. Remove and dispose of debris and all cut squares less than 1/2 square in size.
- B. Vacuum carpet using commercial machine with face-beater element. Remove spots and replace carpet where spots cannot be removed. Remove protruding face yarn.

END OF SECTION

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. Extent of painting work is shown on drawings and schedules, and as herein specified.
- B. The work includes painting and finishing of interior and exterior exposed items and surfaces throughout Project, except as otherwise indicated.
 - 1. Surface preparation, priming, and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.
- C. "Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate, or finish coats.
- D. Surfaces to be Painted: Except where natural finish of material is specifically noted as a surface not to be painted, paint exposed surfaces whether or not colors as designated in "schedules". Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials or areas. If color or finish is not designated, Architect will select these from standard colors or finishes available.
- E. Do not paint over any code-required labels such as Underwriters Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

1.2 QUALITY ASSURANCE

- A. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer on published product data pages, and use only within recommended limits.
- B. Coordination of Work: Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used. Test existing surfaces scheduled to receive new paint or epoxy coating to insure compatibility of new primer and paint system.
- C. Employ only experienced and competent mechanics.
- D. Field Quality Control: Prepare and finish a sample area or room as directed. Finish in accordance with specification requirements for Architect's approval of materials, color and workmanship. Approved area or room shall serve as Project Standard.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's technical information including paint label analysis and application instructions for each material proposed for use.
- B. Provide Owner at completion of job, one gallon of paint of each color selected. Provide original unopened labeled containers with color sample and list of room numbers where used.

1.4 DELIVERY AND STORAGE

- A. Deliver materials to job site in original, new, and unopened packages and containers bearing manufacturer's name and label, and following information:
 - 1. Name or title of material.
 - 2. Federal Specification number, if applicable.
 - 3. Manufacturer's stock number and date of manufacturer.
 - 4. Manufacturer's name.
 - 5. Contents by volume, for major pigment and vehicle constituents.
 - 6. Thinning instructions.
 - 7. Application instructions.
 - 8. Color name and number.
- B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage of paint in a clean condition, free of foreign materials and residue.
 - 1. Protect from freezing where necessary. Keep storage area neat and orderly. Remove oily rags and waste daily. Take all precautions to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing, and application of paints.

1.5 JOB CONDITIONS

- A. Coordinate with other trades to insure adequate ventilation and dust-free environment during application and drying of paint.
- B. Maintain temperature and humidity within Manufacturer's recommended tolerances.
- C. Do not apply paint in snow, rain, fog, or mist; or when humidity exceeds 85%; or to damp or wet surfaces; unless otherwise permitted by paint manufacturer's printed instructions.
 - 1. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.
- D. Painting Contractor shall provide stand mounted, high intensity, portable lighting for their use during painting to provide adequate illumination.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide paint products of one of the following:
 - 1. The Sherwin-Williams Company
 - 2. PPG
 - 3. Benjamin Moore
 - 4. Porter Paints
 - 5. Calhoun Farrell

2.2 MATERIALS

- A. Material Quality: Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.
 - 1. Proprietary names used to designate colors or materials are not intended to imply that products of named manufacturers are required to exclusion of equivalent products of other manufacturers.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Applicator must examine areas and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Applicator.
- B. Starting of painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.
- C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

3.2 SURFACE PREPARATION

- A. General: Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.
 - 1. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify Architect in writing of any anticipated problems in using the specified coating systems with substrates primed by others.
 - 2. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for complete painting of items and adjacent surfaces. Following completion of painting of each space or area, reinstall removed items.

3. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease in accordance with SSPC SP-1, prior to mechanical cleaning. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly-painted surfaces.
- B. Cementitious Materials: Prepare cementitious surfaces of concrete, concrete block, to be painted by removing efflorescence, chalk, dust, dirt, grease, oils in accordance with ASTM D 4258/D 4259/D 4261 (CMV).
1. Determine alkalinity and moisture content of surfaces to be painted by performing ASTM D 4262. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application of paint. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions.
- C. Wood: Clean wood surfaces to be painted of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.
1. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases, paneling.
 2. When transparent finish is required, use spar varnish for back-priming.
 3. Seal tops, bottoms, and cut-outs of unprimed wood doors with a heavy coat of varnish or equivalent sealer immediately upon delivery to job.
- D. Ferrous Metals: Clean ferrous surfaces which are not galvanized or shop-coated of oil, grease, dirt, loose mill scale, and other foreign substances by solvent or mechanical cleaning in accordance with SSPC SP-1.
1. Touch up shop-applied prime coats wherever damaged or bare, where required by other sections of these specifications.
 - a. Clean and touch-up with same type shop primer.
- E. Galvanized Surfaces: Clean free of oil and surface contaminants with non-petroleum based solvent such as Great Lakes Laboratories "Clean N' Etch".

3.3 MATERIALS PREPARATION

- A. Mix and prepare painting materials in accordance with manufacturer's directions.
- B. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.

- C. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

3.4 APPLICATION

- A. General: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
 - 1. Paint colors, surface treatments, and finishes are indicated in "Schedules" of the Contract Documents.
 - 2. Provide finish coats which are compatible with prime paints used.
 - 3. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint, until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces. Dry film thickness will be measured according to SSPC PA-2.
 - 4. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.
 - 5. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat non-specular black paint such as Sherwin-Williams: PM 400 Black, B30 or B400.
 - 6. Paint back sides of access panels, and removable or hinged covers to match exposed surfaces.
 - 7. Finish exterior doors on tops, bottoms, and side edges same as exterior faces unless otherwise indicated.
 - 8. Sand lightly between each succeeding enamel or varnish coat.
 - 9. Omit first coat (primer) on metal surfaces which have been shop-primed and touch-up painted unless otherwise indicated.
- B. Scheduling Painting: Apply first-coat material to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
 - 1. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

- C. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate to establish a total dry film thickness as indicated or, if not indicated, as recommended by coating manufacturer. Dry film thickness will be measured according to SSPC PA-2.
- D. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to those items exposed in mechanical equipment rooms and in occupied spaces, and exposed exterior work that is not factory finish painted.
- E. Prime Coats: Apply prime coat of material which is required to be painted or finished, and which has not been prime coated by others.
 - 1. Re-coat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.
- F. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- G. Transparent (Clear) Finishes: Use multiple coats to produce glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.
 - 1. Provide satin finish for final coats unless otherwise indicated.
- H. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

3.5 CLEAN-UP AND PROTECTION

- A. Clean-Up: During progress of work, remove from site discarded paint materials, rubbish, cans, and rags at end of each work day.
 - 1. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.
- B. Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.
 - 1. Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.

2. At the completion of work of other trades, touch up and restore all damaged or defaced painted surfaces.

3.6 ADJUST AND CLEAN

- A. Clean surfaces of spills, splatters, drips and stains from painting application.
- B. Replace and adjust finish hardware, accessories, fixtures and similar items removed from work.
- C. Touch-up damaged paint surface prior to acceptance of building by the Owner. Mix or thin touch-up paint as recommended by the Manufacturer and blend into existing paint.

3.7 PAINT SYSTEMS

- A. Paints listed are those of Sherwin-Williams unless noted otherwise.
Painting subcontractor wishing to use other products must submit their “or equal” for review during the bidding process. Please note that *colors have been selected*.
- B. Exterior Coating Systems:
 1. Ferrous Metals
Primer: Sherwin-Williams Industrial Enamel, B66W310 @ 2-2.5 mils dft
1st Coat: Sherwin-Williams Industrial Enamel, B66W310 @ 2-2.5 mils dft
2nd Coat: Sherwin-Williams Industrial Enamel B54W00101 @ 2.0-2.5 mils dft per coat
3rd Coat: Sherwin-Williams Industrial Enamel B54W00101 @ 2.0-2.5 mils dft per coat
 - a. Typical Applications: Overhead doors and frames, steel doors and frames, piping, pipe railing, miscellaneous metals.
 2. Zinc Coated Metals
Primer: Sherwin-Williams Pro Industrial ProCryl Universal Primer B66W310 @ 2.0-2.5 mils dft
1st Coat: Sherwin-Williams Pro Industrial ProCryl Universal Primer B54W00101 @ 2.0-2.5 mils dft
2nd Coat: Sherwin-Williams Pro Industrial ProCryl Universal Primer B54W00101 @ 2.0-2.5 mils dft
 3. Concrete Block
Provide clean and dulled surface for application of new paint as recommended by paint manufacturer.
1st Coat: Sherwin-Williams Heavy Duty Block filler B42W46 @ 7.0-14.5 mils dft
2nd Coat: Sherwin-Williams Pro Industrial Multi-Surface Acrylic EgShel, B66W01561 @ 1.5-2.0 mils dft
3rd Coat: Sherwin-Williams Pro Industrial Multi-Surface Acrylic EgShel, B66W01561 @ 1.5-2.0 mils dft

C. Interior Coating Systems:

1. Interior Ferrous Metal: Door Frames, Miscellaneous Metals: 2 coats of an all purpose industrial enamel, over a fast drying, rust inhibitive alkyd enamel.

1st Coat: Sherwin-Williams Pro Industrial ProCryl Universal Primer, B66W310 @ 2.0-2.5 mils dft

2nd Coat: Sherwin-Williams Industrial Enamel B54W00101 @ 2.0-2.5 mils dft per coat

3rd Coat: Sherwin-Williams Industrial Enamel B54W00101 @ 2.0-2.5 mils dft per coat

2. Interior Gypsum Drywall (semi-gloss): 2 coats of an interior waterborne acrylic semi-gloss, durable and non-yellowing, over an interior vinyl acrylic latex wall primer.

1st Coat: Sherwin-Williams Quick Dry Interior Exterior Stain Blocking Primer @ 1.2-1.5 mils dft

2nd Coat: Sherwin-Williams ProMar 200 Zero VOC Semi-Gloss B31W02651 @ 1.5 mils dft

3rd Coat: Sherwin-Williams ProMar 200 Zero VOC Semi-Gloss B31W02651 @ 1.5 mils dft

3. Interior Gypsum Drywall (flat): 2 coats of an interior latex flat, durable and non-yellowing, over an interior latex wall primer.

Primer: Sherwin-Williams Quick Dry Interior Exterior Stain Blocking Primer, B51W08670 @ 1.2-1.5 mils dft

1st Coat: Sherwin-Williams ProMar 200 Zero VOC Flat, B30W02651 @ 1.4-2.0 mils dft

2nd Coat: Sherwin-Williams ProMar 200 Zero VOC Flat, B30W02651 @ 1.4-2.0 mils dft

4. Interior Gypsum Drywall (eggshell): 2 coats of an interior latex eggshell, durable and non-yellowing, over an interior latex wall primer.

Primer: Sherwin-Williams Quick Dry Interior Exterior Stain Blocking Primer, B51W08670 @ 1.2-1.5 mils dft

1st Coat: Sherwin-Williams ProMar 200 Zero VOC EgShel, B20W02651 @ 1.5 mils dft

2nd Coat: Sherwin-Williams ProMar 200 Zero VOC EgShel, B20W02651 @ 1.5 mils dft

5. Galvanized Metal: 2 coats of an interior waterborne acrylic semi-gloss, durable and non yellowing

1st Coat: Sherwin-Williams DTM Primer/Finish, B66W0001 @ 2.2-3.5 mils dft

2nd Coat: Sherwin-Williams Pro Industrial Acrylic, B66W00651 @ 1.5-4.0 mils dft

6. Aluminum: 2 coats of an interior waterborne acrylic semi-gloss, durable and non yellowing.

1st Coat: Sherwin-Williams Pro Industrial Acrylic, B66W00651 @ 1.5-4.0 mils dft

2nd Coat: Sherwin-Williams Pro Industrial Acrylic, B66W00651 @ 1.5-4.0 mils dft

7. Wood-Closed Grain: Stained: 2 coats of a satin waterborne polyurethane over an interior oil based stain.

1st Coat: S-W WoodClassics Interior Oil Stain, A49N00202

2nd Coat: S-W WoodClassics Waterborne Polyurethane Varnish, A68V0091

3rd Coat: S-W WoodClassics Waterborne Polyurethane Varnish, A68V0091

8. Concrete Floors (Unpolished)

1 application of Prosoco "Consolideck LS/CS" @ 300 - 800 sq.ft./gallon, using low pressure spray-on method as directed by manufacturer.

Note: New concrete must cure long enough to walk on before application. Do not use concrete curing compound where product is specified. Blanket-cure ONLY.

9. Exposed Structural Steel: 2 coats of a semi-gloss waterborne dryfall

1st Coat: S-W Pro Industrial DTM Primer-Finish, B66W0001 @ 2.2-3.5 mils dft

2nd Coat: S-W Pro Industrial Waterborne Dryfall, B42W00083 @ 2.3-3.5 mils dft

3rd Coat: S-W Pro Industrial Waterborne Dryfall, B42W00083 @ 2.3-3.5 mils dft

END OF SECTION

SECTION 10155 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Metal partitions for toilets.
- B. Urinal Screens
- C. Attachment hardware.

1.02 RELATED WORK

- A. Section 10800 - Toilet and Bath Accessories: Toilet accessories.

1.03 REFERENCES

- A. ASTM A424 - Steel Sheets for Porcelain Enameling.
- B. FS RR-P-1352 - Partitions, Metal Toilet, Complete.
- C. ASTM A526 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.
- D. ASTM A167 - Stainless and Heat Resisting Chromium-Nickel Steel, Plate, Sheet and Strip.

1.04 SUBMITTALS

- A. Submit shop drawings and product data, along with manufacturer's descriptive literature, installation instructions and appropriate color selection charts.
- B. Clearly indicate partition layouts, swing of doors, elevations, anchorage and mounting details, panel construction, components hardware, finishes and all relevant dimensions.

PART 2 - PRODUCTS

2.01 METAL TOILET COMPARTMENTS

- A. Acceptable Manufacturers
 - 1. Flush-Metal Partition Corp.
 - 2. Metpar
 - 3. Sanymetal
 - 4. Approved Equal
- B. Type
 - 1. Provide floor-mounted, overhead-braced toilet partitions with anti-grip headrail.

2. Provide pilaster-type floor-supported urinal screens.
3. Provide end stalls to meet ADA requirements.

C. Materials

1. 1" thick, of two sheets galvanized steel, honeycomb core, welded edges and corners.
2. Finish: Baked enamel. Color to be selected by Architect.
3. Attachments, Screws and Bolts: Stainless steel, tamper-proof type, heavy duty extruded aluminum brackets.
4. Hardware: Chrome-plated non-ferrous cast pivot hinges, gravity type, adjustable for door closing positioning; nylon bearings; concealed, thumb-turn door latch; door strike and keeper with rubber bumper; chrome plated coat hook and bumper.

D. Fabrication

1. Fabricate partitions in accordance with FS RR-P-1352
2. Doors and Panels: 1" or 1-1/4" x 58" high, 24" wide doors at standard stalls, 34" wide doors at handicap stalls.
3. Provide internal reinforcement where necessary for attachment of hardware and fittings. Mark locations of reinforcement for partition-mounted washroom accessories.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Examine site conditions to which work is to be applied. Report discrepancies to Architect/ Engineer in writing.
- B. Take site dimensions affecting this work.
- C. Ensure correct spacing of plumbing fixtures.
- D. Ensure correct location or built-in framing, anchorage, and bracing, where required.

3.02 INSTALLATION

- A. Install partitions secure, plumb, level, and square.
- B. Leave 1/2 inch space between wall and panels and between wall and end plasters.
- C. Attach panel brackets securely to walls using anchor devices as required by manufacturer.
- D. Attach panels and pilasters to bracket with through sleeve tamperproof bolts and nuts.

- E. Anchor urinal screen panels to walls with two panel brackets and vertical upright to floor.
- F. Provide for adjustment of floor variations.
- G. Equip each door with hinges, one door latch, and one coat hook and bumper.
- H. Install door strike keeper and door bumper on each pilaster in alignment with door latch.
- I. Adjust and align hardware to uniform clearance at vertical edges of doors not exceeding $\frac{1}{4}$ ".
- J. Adjust hinges to locate doors in partial open position when unlatched, except that out-swing doors shall return to closed position.

3.03 CLEANING

- A. Damaged, scratched or marred defective materials will be rejected, and shall be replaced with new materials.
- B. Remove protective maskings. Clean surfaces free of oil and imperfections.

End of Section

SECTION 10426 - IDENTIFYING DEVICES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Furnish and install all signage and identifying devices and handicap parking signs were shown or scheduled on the Drawings and specified herein.
- B. This section includes the installation of such devices in locations as indicated on plans, or where not shown, as required to meet requirements of the Americans with Disability Act of 1990 (ADA).

1.02 SUBMITTALS

- B. Manufacturer's Data: Submit manufacturer's descriptive literature and specifications, including color samples of material for selection, as applicable for approval.
- B. Submit shop drawings listing sign styles, lettering and locations, and overall dimensions of each sign.

1.03 REFERENCES

- A. American National Standards Institute (ANSI): A117.1 - 1992 Accessible Signage Standards (4.28 Signage)
- B. American Society for Testing and Materials (ASTM).
- C. Americans with Disabilities Act Accessibility Guideline (ADAAG): 4.30 Signage
- D. California Title 24 Accessible Signage Standards (3105)

1.04 DELIVERY, STORAGE & HANDLING

- A. Deliver components correctly packaged to prevent damage.
- B. Store in secure areas, out of weather and protected from work of other trades.

1.05 WARRANTY

- A. Provide Manufacturer's standard one-year limited warranty covering manufacturing defects.

PART 2 - PRODUCTS

2.01 TACTILE SIGNAGE

- A. Tactile signage stating "EXIT" and complying with ICC/ANSI A117.1, shall be installed adjacent to the latch side of the door, 48" minimum/60" maximum above the finished floor to center of sign.

Sign shall be 4"x4" unless space is restricted, then 2"x8" sign shall be used.

Locate at doors #01, 02, 03, 10, 12, 13, 16, 17, 19, 20 & 49.



2.03 INTERIOR ROOM SIGNAGE

- A. Style: Signs shall be single-faced, Lettering Specialists, Inc. - Tactile Signage, Inc., or an approved equal, radiused corners, beveled edge with decorative reveal around the perimeter; Optima semi-bold style, color as selected by Architect. Schedule shall be as furnished by the Architect/Owner. Composition shall be a design similar to manufacturers standards and meeting all requirements of Americans with Disabilities Act (ADA). Signs shall be mounted with double-faced tape as furnished by the manufacturer.
- B. Pictograms: Pictograms (where required) shall be accompanied by the equivalent verbal description placed directly below the pictogram. The border dimensions of the pictogram shall be 6 inches minimum in height. Pictograms, like non-permanent text, may be recessed.
- C. Mounting Location and Height: Signs shall be installed on the wall adjacent to the latch side of the door. Where there is no wall space to the latch side of the door, including at double leaf doors, signs shall be placed on the nearest adjacent wall. Mounting height shall be 60 inches above the finished floor to the centerline of the sign.
- D. SCHEDULE:

<u>Room No.</u>	<u>Description</u>	<u>Qty.</u>	<u>Sign Type</u>
108	Unisex w/ ADA symbol	1	A
109	Unisex w/ ADA symbol	1	A
112	Men w/ ADA symbol	1	B
133	Men w/ ADA symbol	1	B
113	Women w/ ADA symbol	1	C
132	Women w/ ADA symbol	1	C



A



B



C

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Before installing signs, verify that mounting surfaces are completely finished and ready for installation. Inspect surface to be sure it is clean and free from contaminants that may adversely affect mounting system adhesion.
- B. Do not install signs until surfaces are acceptable. Notify Architect if there are any questions as to suitability of installation surfaces or installation locations.

3.02 INSTALLATION

- A. Install signs in accordance with manufacturer's instructions and in accordance with ADA guidelines for location and as indicated in schedules.
- B. Install after doors are installed and after doors and walls are finished.
- C. Assure signs are installed level.
- D. Mounting Location and Height: Signs shall be installed on the wall adjacent to the latch side of the door. Where there is no wall space to the latch side of the door, including at double leaf doors, signs shall be placed on the nearest adjacent wall. Mounting height shall be 60 inches above the finished floor to the centerline of the sign.

3.03 CLEANING AND PROTECTION

- A. At completion of the installation, clean soiled sign surfaces in accordance with the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

END OF SECTION

SECTION 10522 - FIRE EXTINGUISHERS AND ACCESSORIES

PART 1 - GENERAL

1.01 Work Included

- A. Fire extinguishers
- B. Cabinets and wall mounting brackets

1.02 References

- A. NFPA 10 Portable Fire Extinguishers.

1.03 Quality Assurance

- A. Conform to NFPA 10 requirements for extinguishers.

1.04 Submittals

- A. Submit product data.
- B. Submit manufacturer's installation instruction.

1.05 Operation and Maintenance Data

- A. Submit manufacturer's operation and maintenance data.
- B. Include test, refill or recharge schedules, procedures, and re-certification requirements.

1.06 Environmental Requirements

- A. Do not install extinguishers when ambient temperatures may cause freezing.

PART 2 - PRODUCTS

2.01 Acceptable Manufacturers or an approved equal.

- A. Larsen
- B. J.L. Industries
- C. Modern Metal Products.
- D. Substitutions: Reviewed equal.

2.02 Extinguishers

- A. Fire Extinguishers #1-#13 shall be Larsen Model MP10, 10 lbs., U.L. Rating 4A-60B:C, J.L. Industries, or an approved equal.
- B. For location of extinguishers, see Floor Plan.

2.03 Cabinets/Accessories

- A. Fire Extinguishers #1, #2, #5, #7, #9 and #10 shall be mounted in a semi-recessed cabinet, Larsen Model 2409-6R, non fire-rated cabinet, clear anodized aluminum with Vertical Duo, partial glass door and 2½" rolled edge.
- B. Fire Extinguishers #3, #4, #6, #8, #11, #12 and #13 shall be wall-mounted with manufacturer's standard bracket.

PART 3 - EXECUTION

3.01 Installation

- A. Install fire extinguishers 36" a.f.f. or as required by NFPA 10. Top of cabinet mounted at 60" a.f.f.
- B. Secure rigidly in place in accordance with manufacturer's instructions.

End of Section

SPECIFICATION 10530 –EXTRUDED ALUMINUM CANOPY

PART 1 - GENERAL

1.01 Related Documents

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, shall apply to work specified in this section.

1.02 General Description of Work

A. Work in this section shall include design, fabrication and installation of a complete extruded aluminum canopy system in accordance with the drawings and this specification.

1.03 References

- A. Aluminum Design Manual 2000, Specifications & Guidelines for Aluminum Structures.
- B. ASCE 7, Minimum Design Loads for Buildings and Other Structures.
- C. American Architectural Manufacturers Association (AAMA)
- D. American Society for Testing and Materials (ASTM)

1.04 Related Sections

- A. Concrete Work - Section 03300
- B. Masonry Work - Section 04200
- C. Miscellaneous Metals - Section 05500
- D. Flashing and Sheet Metal - Section 07600
- E. Sealants - Section 07900

1.05 Submittals

- A. Product Data: Submit manufacturer's product information, specifications and installation instructions for components and accessories.
- B. Shop Drawings: Submit complete erection drawings showing attachment system, column and gutter beam framing, transverse cross sections, covering and trim details, and optional installation details to clearly indicate proper assembly of components, sealed by a State Registered Structural Engineer registered in the state in which the work is being performed.

- C. Calculations: Submit complete structural design calculation sealed by State Registered Structural Engineer registered in the state in which the work is being performed.
- D. Design and engineering of attachment surfaces are not covered in this specification and scope of work.

1.06 Quality Assurance

A. Codes and standards: Comply with provisions of the following except as otherwise indicated: Local building codes including the 2003 International Building Code, latest addition with amendments, if any. AWS (American Welding Society) standards for structural aluminum welding.

B. Manufacturer: Obtain aluminum canopy system from only one (1) manufacturer, although several may be indicated as offering products complying with requirements.

C. Installer Qualifications: Firm with not less than three (3) years experience in installation of aluminum canopy of type, quantity and installation methods similar to work of this section.

D. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication where possible, to insure proper fitting of work.

E. Coordination: Coordinate work of this section with work of other sections which interface with canopy system (sidewalk, curbs, building fascias, etc.).

1.07 Warranty

A. Provide manufactures standard one-year warranty that shall include, but not limited to, coverage for structural, water tightness and finish beginning the day of Substantial Completion of Installation.

PART 2 - PRODUCT

2.01 Manufacturers

A. Contract documents are based on products manufactured by:

- **Tennessee Valley Metals, Inc.**
190 Industrial Park Road, Oneonta, AL 35121
205.274.9500, fax 205.274.9501
800.551.2579
sales@tvmetals.com , www.tvmetals.com

B. Interested manufacturers will be considered for substitution only when the following conditions are met: Complete details, including sizes of all members and structural calculations showing loads applied in accordance with the specification must be submitted to the architect for review. Submit complete details with structural properties (moment of inertia, section modules, modules of elasticity, etc.) for all proposed sections (bents, columns, decking and other structural members).

2.02 Materials

A. Aluminum Extrusions: All sections shall be extruded aluminum 6063 alloy, heat treated to T-6 temper.

B. Finishes: For factory baked enamel finish, specify AAMA 603.8 standard or custom color.

For fluoropolymer (Kynar) finish, AAMA 605.2, two or three coats.

For satin anodized finish, specify 204.R1 meeting Aluminum Association specification AA-M-10C-22A21.

2.03 Components

A. Deck: Deck shall be extruded self-flashing sections interlocking into a composite unit.

B. Fascia: Fascia shall be manufacturer's standard shape. Size as indicated on drawings.

C. Flashing: Flashing shall be .032" aluminum (min.). All thru-wall flashing is completed by others.

D. Scuppers: Scupper plates shall be used to drain water from the canopy fascia. (Downspouts are available as an option).

E. Fasteners: All exposed fasteners shall be stainless steel.

2.04 Fabrication

A. Drainage: Water shall drain directly from the fascia and be diverted by a scupper plate (or into downspout and discharged at ground level).

B. Deck Construction: Deck shall be manufactured of extruded modules that interlock in a self-flashing manner.

PART 3 - EXECUTION

3.01 Preparation

A. Erection shall be performed after all concrete, masonry, and roofing work in the vicinity is complete and cleaned.

3.02 Installation

Protective cover shall be erected true to line with adequate slope for drainage. Adequate framing members and/or blocking shall be provided in the wall structure (by others) to safely support the canopy.

3.03 Cleaning

A. All protective cover components shall be cleaned promptly after installation.

3.04 Protection

A. Extreme care shall be taken to protect materials during and after installation.

SPECIFICATION - SECTION 10650 - OPERABLE PARTITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes manually operated, paired panel operable partitions.

B. Related Sections include the following:

1. Division 03 Sections for concrete tolerances required.
2. Division 05 Sections for primary structural support, including pre-punching of support members by structural steel supplier per operable partition supplier's template.
3. Division 06 Sections for wood framing and supports, and all blocking at head and jambs as required.
4. Division 09 Sections for wall and ceiling framing at head and jambs.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified in writing by the operable partition manufacturer, as qualified to install the manufacturer's partition systems for work similar in material, design, and extent to that indicated for this Project.

B. Acoustical Performance: Test operable partitions in an independent acoustical laboratory in accordance with ASTM E90 test procedure to attain no less than the STC rating specified.

Provide a complete and unedited written test report by the testing laboratory upon request.

C. Preparation of the opening shall conform to the criteria set forth per ASTM E557 *Standard Practice for Architectural Application and Installation of Operable Partitions*.

1.4 SUBMITTALS

A. Product Data: Material descriptions, construction details, finishes, installation details, and operating instructions for each type of operable partition, component, and accessory specified.

B. Shop Drawings: Show location and extent of operable partitions. Include plans, elevations, sections, details, attachments to other construction, and accessories. Indicate dimensions, weights, conditions at openings, and at storage areas, and required installation, storage, and operating clearances. Indicate location and installation requirements for hardware and track, including floor tolerances required and direction of travel. Indicate blocking to be provided by others.

C. Samples: Color samples demonstrating full range of finishes available by architect.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Clearly mark packages and panels with numbering systems used on Shop Drawings. Do not use permanent markings on panels.

B. Protect panels during delivery, storage, and handling to comply with manufacturer's direction and as required to prevent damage.

1.6 WARRANTY

- A. Provide written warranty by manufacturer of operable partitions agreeing to repair or replace any components with manufacturing defects.
- B. Warranty period: Two (2) years.

PART 2 – PRODUCTS

2.1 MANUFACTURERS, PRODUCTS, AND OPERATION

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Modernfold, Inc.
 - 2. Hufcor, Inc.
 - 3. Approved equal
- B. Products: Subject to compliance with the requirements, provide the following product:
 - 1. Acousti-Seal #932FS manually operated, floor supported paired panel operable partition.

2.2 OPERATION

- A. Acousti-Seal #932FS: Series of paired flat panels hinged together in pairs, manually operated, floor supported with no mechanical floor seals.
- B. Hinged Panel Closure

2.3 PANEL CONSTRUCTION

- A. Nominal 3-inch thick panels in manufacturer's standard 48-inch widths. All panel horizontal and vertical framing members fabricated from minimum 18-gage formed steel with overlapped and welded corners for rigidity. Top channel is reinforced to support suspension system components. Frame is designed so that full vertical edges of panels are of formed steel and provide concealed protection of the edges of the panel skin.
- B. Panel Skin: 1/2-inch tackable 100% recycled gypsum board, class "A" rated single material or composite layers continuously bonded to panel frame. Acoustical ratings of panels with this construction shall be minimum 47 STC.
- C. Hinges for Panels and Closure Panels shall be full leaf butt hinges, attached directly to panel frame with welded hinge anchor plates within panel to further support hinge mounting to frame. Lifetime warranty on hinges. Hinges mounted into panel edge or vertical astragal are not acceptable.
- D. Panel Trim: No vertical trim required or allowed on edges of panels; minimal groove appearance at panel joints.
- E. Panel Weights: 47 STC - 7 lbs./square foot

2.4 PANEL FINISHES

- A. Panel face finish shall be reinforced heavy duty vinyl with woven backing weighing not less than 30 ounces per lineal yard.
- B. Panel trim: Exposed panel trim of one consistent color from manufacturer's standard offering.

2.5 SOUND SEALS

A. Vertical Interlocking Sound Seals between panels: Roll-formed steel astragals, with reversible tongue and groove configuration in each panel edge for universal panel operation. Rigid plastic astragals or astragals in only one panel edge are not acceptable.

B. Horizontal Top and Bottom Seals: Continuous contact extruded vinyl bulb shape with pairs of non-contacting vinyl fingers to prevent distortion without the need for mechanically operated parts.

2.6 SUSPENSION SYSTEM

A. #17 Floor Supported Suspension System

1. Floor Track: Minimum 16-gage stainless steel shall support nominally 80% or more of the panel weight. Surface mounted application shall require no alteration of the floor surface. Recessed floor track shall require a kerf no wider than 1-inch nor deeper than 1-inch.

2. Suspension Tracks: Minimum 11-gage, 0.12-inch roll-formed steel track, suitable for either direct mounting to a wood header or supported by adjustable steel hanger brackets, supporting the load-bearing surface of the track, connected to structural support by pairs of 3/8-inch (9.5 mm) diameter threaded rods. Aluminum track is not acceptable. Exposed track soffit shall be steel, integral to track, and pre-painted off-white.

3. Carriers: One all-steel trolley with steel-tired ball bearing wheels per panel (except hinged panels). Non-steel tires are not acceptable.

PART 3 – EXECUTION

3.1 INSTALLATION

A. General: Comply with ASTM E557, operable partition manufacturer's written installation instructions, Drawings and approved Shop Drawings.

B. Install operable partitions and accessories after other finishing operations, including painting, have been completed.

C. Match operable partitions by installing panels from marked packages in numbered sequence indicated on Shop Drawings.

D. Broken, cracked, chipped, deformed, or unmatched panels are not acceptable.

3.2 CLEANING AND PROTECTION

A. Clean partition surfaces upon completing installation of operable partitions to remove dust, dirt, adhesives, and other foreign materials according to manufacturer's written instructions.

B. Provide final protection and maintain conditions in a manner acceptable to the manufacturer and installer that insure operable partitions are without damage or deterioration at time of Substantial Completion.

3.3 ADJUSTING

A. Adjust operable partitions to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and other moving parts.

3.4 EXAMINATION

A. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable partitions. Proceed with installation only after unsatisfactory conditions have been corrected.

3.5 DEMONSTRATION

- A. Demonstrate proper operation and maintenance procedures to Owner's representative.
- B. Provide Operation and Maintenance Manual to Owner's representative.

SECTION 10800 - TOILET ROOM ACCESSORIES

PART 1 - GENERAL

1.01 Work Included

- A. Toilet room accessories.

1.02 Related Work

- A. Wall blocking required to secure accessories
- B. Glazing/caulking
- C. Toilet compartments
- D. Gypsum wallboard systems
- E. Plumbing fixtures
- F. Countertops

1.03 References (including but not limited to)

- A. ANSI A117 - 1986 Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
- B. UBC - Chapters 5 and 33 Requirements for Handicapped.
- C. Title 24, California Code of Regulations, Parts 2, 3, and 5.
- D. ADA, Accessibility Guidelines for Buildings and Facilities, Federal Register Volume 56, Number 144, Rules and Regulations.
- E. Fair Housing Amendments Act of 1988, Accessibility Guidelines, Federal Register Volume 56, Number 44.

1.04 Quality Assurance

A. Manufacturer

1. Model numbers for toilet room accessories manufactured by Bradley Corp. Washroom accessories are listed to establish a standard of quality for design, function, materials, workmanship and appearance. Other manufacturers may be submitted for evaluation by the architect by following the conditions of the substitutions clause. Unless approval is obtained 10 days prior to the bid date, all bids shall be based on the standard of quality. The architect shall be the sole judge as to the acceptability of all products submitted for substitutions.
2. Accessories shall be the products of a single manufacturer. Accessories with tumbler locks shall be keyed alike.

B. Regulatory requirements

1. Operation of accessories shall comply with guidelines set forth by the American Disabilities Act, Title III. Documentation and samples to be provided to the architect upon request.

1.05 Submittals

A. Comply with requirements of Section regarding submittals.

B. Manufacturer's Data

1. Provide required number copies of:
 - a. Product data sheets.
 - b. Installation instructions.
 - c. Service and parts manual.

1.06 Product Delivery, Storage, and Handling

- A. Deliver items in manufacturer's original unopened protective packaging.
- B. Store materials in original protective packaging to prevent physical damage, or wetting.
- C. Handle so as to prevent damage to accessories.

1.07 Warranty

- A. Furnish one year guarantee against defects in material and workmanship on all accessories. In addition, welded stainless steel framed mirrors shall have a fifteen year guarantee against silver spoilage.

PART 2 - PRODUCTS

2.01 Toilet Room Accessories Schedule:

- A. Grab Bars of sizes as shown on plans, #812-001, heavy-duty stainless steel with sanitary safety grip finish, concealed mounting kits to be included.
- B. Mirror 20" x 42", #7802-20 x 42, angle framed mirror, 1/4" tempered glass.
- C. Mirror 30" x 42", #7802-30 x 42, angle framed mirror, 1/4" tempered glass.
- D. Paper Towel Dispenser #2494 Electronic Sensor Roll Towel Dispenser, ABS Plastic, Surface-mounted

- E. Soap Dispenser, Model #6562, wall-mounted, vertical valve liquid soap dispenser, brushed stainless steel finish.
- F. Soap Dispenser, Model #6326-68, deck-mounted, 6" stainless steel spout pump soap dispense with, 32 oz. plastic liquid soap container.
- G. Toilet Tissue Dispenser, Model #5425, jumbo dual-roll, surface-mounted, satin finish stainless steel.
- H. Napkin Disposal, Model #4722-15, surface-mounted, stainless steel, with (1) box of 500 waxed paper waste/napkin disposal liners #P11-022.

2.02 Materials (if applicable to items in contract)

- A. All cabinets shall be constructed of 18-8, type 304 stainless steel.
- B. All waste receptacle shall be constructed of 18-8, type 304 stainless steel or rigid molded leak-proof plastic.
- C. All tumbler locks to be fastened to accessories with lock nuts. Fastening locks to units with spring clip is not acceptable.

PART 3 - EXECUTION

3.01 Inspection

- A. Check wall opening for dimensions, plumbness of blocking or frames that would affect installation of recessed accessories. For surface mounted accessories check condition of wall and confirm installation of backing within wall.
- B. Verify spacing of plumbing fixtures and toilet compartments that affect installation of toilet room accessories.

End of Section

SECTION 13120 - STEEL BUILDING SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES:

- A. Pre-engineered building and components including the following:
 - 1. Structural steel frame.
 - 2. Roof covering system including exterior roof panels, panel attachments, sealants, mastics, trim and flashings.
 - 3. Exterior wall system including wall panels, panel attachments, sealants, mastics, trim and flashings.
- B. Wall accessories including the following:
 - 1. Louvers, see mechanical for size.

1.02 RELATED SECTIONS

- A. Section - Cast-in-Place Concrete: Foundations and anchor bolts.
- B. Section 09900 - Paints and Coatings: Finish painting of structural members, doors, roof curbs, and factory prime painted miscellaneous items.

1.03 REFERENCES

- A. AWS D1.1 - Structural Welding Code; American Welding Society.
- B. Factory Mutual (FM): Wind classification rating system.
- C. IAS AC472 International Accreditation Services.
- D. NAIMA 202 - Standard for Flexible Fiber Glass Insulation Used in Metal Buildings; North American Insulation Manufacturers Association.
- E. UL 580 - Tests for Wind Uplift Resistance of Roof Assemblies; Underwriters Laboratories Inc.
- F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.
- G. Canadian Welding Bureau: A660 Certification.

1.04 DEFINITIONS

- A. Building Width: Measured from outside to outside of sidewall girts. Typically edge to edge of concrete.
- B. Building Length: Measured from outside to outside of end wall girts. Typically edge to edge of concrete
- C. Building Line: Outside face of steel/girt.
- D. Building Eave Height: Measured from the top of the eave member at the outside of the sidewall girt line to the bottom of the sidewall column base plate or to finished floor if columns are on grout or recessed below finished floor.
- E. Bay Spacing: Measured from centerline to centerline of primary frames for interior bays and from centerline of the first interior frame to outside of end wall girts for end bays.
- F. Roof Pitch: The ratio of the vertical rise to the horizontal run (i.e. 1:12 = 1 inch of rise for every foot of horizontal dimension).

1.05 SYSTEM DESCRIPTION

- A. General:
 - 1. Provide metal building frame, metal wall panels, metal roof panels, accessories and miscellaneous materials for a complete enclosure including supports for building components specified in other sections.
 - 2. Design structural systems according to professionally recognized methods and standards and legally adopted building codes.
 - 3. Design under supervision of professional engineer licensed in the jurisdiction of the Project.
 - B. Design Requirements:
 - 1. Bay size: see drawings.
 - 2. Roof pitch: see drawings.
 - 3. Building location zip code: 42642
 - 4. See structural notes.
11. Panel Requirements:
- a. SSR Roof System tested and certified to meet Underwriters Laboratories UL 90 wind uplift rating.

1. Panels tested in accordance with U.S. Corp of Engineers ASTM E 1592.
2. Panel fastening meeting uplift requirements based on tested fastener values with appropriate Safety Factors.
3. Purlin strength with SSR roof panel determined and tested in accordance with AISI procedures.
- b. Panel Rib panels are accepted for use by the Dade County Building Commission and are UL-60 and UL-90 certified.
- c. All load and code information must be obtained directly from the Authority Having Jurisdiction.

C. Performance Requirements:

1. System to withstand gravity and lateral loads in compliance with contract documents.
2. Refer to contract drawings for additional concentrated loads to pre-engineered building hanger beams and support jacks.
3. Allowable Deflections: Deflection/drift criteria shall follow recommendations outlined in AISC Design Guide 3 and MBMA Serviceability recommendations.
4. Metal wall panels (interior and exterior) shall not to be used as shear elements. Specify if metal wall and girt assembly require specific deflection constraints
5. Construct assembly to permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of 100 degrees F (37 degrees C) in a 24 hour period.
6. Design and fabricate wall and roof systems free of distortion or defects detrimental to appearance or performance. Some oil canning in rolled panels especially in the flats of the panel is normal and is not cause for rejection.

- D. Serviceability Criteria: Deflection limits for major components based on Manufacturers standards unless otherwise noted. Deflection requirements on hangars with sliding or fabric doors need to be included for the door support frames both from dead load deflection in inches and uplift deflection in inches. This may differ from the building due to the specific door requirements and should be supplied to eliminate future deflection issues.

1.06 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Design Data: Provide detailed design criteria and calculations prepared by a licensed structural engineer.
- C. Certification: Manufacturer certification that the building conforms to the contract documents and manufacturer's standard design procedures.

- D. Shop Drawings: Show building layout, primary and secondary framing member sizes and locations, cross-sections, and product and connection details.
 - 1. Anchor Bolt Installation Drawings.
- E. Information on manufactured products to be incorporated into the project.
- F. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- G. Verification Samples: For each finish product specified, two samples, minimum size 6 inches square, representing actual product, color, and patterns.
- H. Certificates: Welder certifications

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Not less than 5 years experience in the actual production of specified products.
 - 1. Member of the Metal Building Manufacturer's Association (MBMA).
 - 2. Primary manufacturer of frames, secondary steel, roof and wall sheeting, and trim.
- B. Installer Qualifications - Firm experienced in application or installation of systems similar in complexity to those required for this project, plus the following:
 - 1. Acceptable to or licensed by manufacturer.
 - 2. 3 years experience with systems.
 - 3. Successfully completed not less than 5 comparable scale projects using this system.

1.08 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.

1.09 PROJECT 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.

1.10 WARRANTY

- A. Manufacturer shall warranty installed system for the periods described herein, starting from Date of Substantial Completion or ninety days from delivery, whichever comes first, against all the conditions indicated below. When notified in writing from Owner, manufacturer/installer shall, promptly and without inconvenience and cost to Owner, correct said deficiencies.
 - 1. Materials and Workmanship Warranty:
 - a. Warranty Period: 3 years, standard.
 - 2. SSR/SLR Standard Weathertight Endorsement:
 - a. Warranty Period: 20 years.
 - 3. Finish Warranty:
 - a. Finish coating shall not peel, blister, chip, crack or check in finish, and shall not chalk in excess of 8 numerical ratings when measured in accordance with ASTM D 4214.
 - b. Finish coating shall not change color or fade in excess of 5 NBS units as determined by ASTM D 2244.
 - 1. Panel finish: 25 years.
 - 4. Performance Warranty: Furnish written warranty, stating sheet metal roofing system and flashing (flashing under premium warranty only) under this Section will be maintained in watertight condition and defects resulting from the following items will be corrected without cost to Owner for a period of 20 years.
 - a. Faulty workmanship.
 - b. Defective materials including sealants and fasteners.
 - c. Water infiltration.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers: Nationally recognized companies.
- B. Substitutions: Reviewed equal.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.02 STRUCTURAL STEEL FRAMING

- A. Primary Framing: Rigid Frame solid web framing consisting of tapered or uniform depth rafters rigidly connected to tapered or uniform depth columns. Provide a clear span that supports the loads at bay spacing indicated.
- B. Primary Framing: Continuous Beam (CB Series) solid web framing utilizing tapered or uniform depth beams or girders supported on tapered or uniform depth columns.

Locate interior columns where indicated and designed to support loads at bay spacing indicated.

- C. End Wall Framing: Corner posts, end posts and rake beams.
- D. End Wall Framing: Half-loaded full frames.
- E. Steel Surface Preparation: SSPC-SP 2.

2.03 SECONDARY FRAMING

- A. Purlins: Zee-shaped; depth as required; with minimum yield strength of 60,000 psi (410 MPa); simple span or continuous span as required for design. G-30 galvanized standard material. Welded members are manufacturer's standard primer.
 - 1. As required.
- B. Girts: Zee- or Cee-shaped; depth as required, with minimum yield strength of 60,000 psi (410 MPa); simple span or continuous span as required for design. G-30 galvanized standard material. Welded members are manufacturer's standard primer.
 - 1. As required.
- C. Wind Bracing: Portal, torsional, diagonal bracing or diaphragm in accordance with manufacturer's standard design practices; utilizing rods, angles, and other members, with minimum yield strengths as required for design but in most cases, 50 ksi.
- D. Primary Frame Flange Bracing: Attached from purlins or girts to the primary framing, minimum yield strength as required for design but in most cases 60 ksi.

2.04 MISCELLANEOUS FRAMING

- A. Base Angles: 2 inch by 3 inch by 0.060 inch galvanized steel angles, with minimum yield strength of 55 ksi (380 MPa), anchored to the floor slab or grade beam with power driven fasteners or equivalent at a maximum spacing of 4 feet on center and not more than 6 inches from the end of any angle member. Anchors are not provided by the metal building manufacturer.
- B. Door Headers and Jambs: Zee- or Cee-shaped; depth as required; with minimum yield strength of 60 ksi (410 MPa).

2.05 ROOF COVERING SYSTEM

- A. Roof Panels: SSR Standing Seam Roof Panels; 24 inches wide net coverage, with 3 inches high major ribs formed at the panel side laps, formed for field seaming using electrically operated seaming machine.
 - 1. Side joints: Factory applied sealant for field seaming.
 - 2. Material: Galvalume steel.

3. Thickness: 24 gauge.
4. See drawings for roof slopes.
5. Side laps: Two factory-formed interlocking ribs, with one weather sealed joint, field-seamed into place to form a double-fold 360 degree seam.
6. Length: Continuous from eave to ridge up to 52 feet in length.
7. End laps, where required: 4 inches wide, located at a support member.
8. Panel-to-roof purlin structural attachments: SSR clips with movable tabs which interlock with seamed SSR panel ribs and provide for 1-5/8 inches of panel movement in either direction from center of clip to compensate for thermal effects.
9. Ridge assembly for high end of slopes: SSR Ridge; draw-formed aluminum seam caps factory-attached to SSR ridge panels that are seamed together along the center of the ridge, utilizing only one weather sealed joint and providing a true expansion joint for panel movement.
10. Rake edge of roof shall be attached to the building structure in a manner which will allow thermal expansion of the SSR roof panels along the gables and will provide the uplift resistance required by code.
11. The KXL paint system is a PVDF finish applied to the galvalume surface to give a long life color that resists fading and chalking. KXL is a 1 mil nom. PVDF finish with 70 percent Kynar 500 or Hylar 5000 standard.
12. Exposed fasteners are stainless steel capped painted to match the selected color from the Manufacturer's color chart or special ordered if a special color roof is provided.

2.06 WALL COVERING SYSTEM

- A. Wall Panels: Panel Rib; 36 inch wide net coverage, with 1-3/16 inch high major ribs at 12 inches on center with minor ribs spaced between the major ribs.
 1. Material: Galvanized steel, with G90/Z275 coating.
 2. Thickness: 26 gauge; all buildings.
 3. Side laps: Two fully overlapping major ribs secured together with 1/4 inch diameter color-matched carbon steel fasteners.
 4. Length: Continuous from sill to eave up to 43 feet in length.
 5. End laps, where required: 4 inches wide, located at a support member.
 6. Crimp panels at the base to achieve no gaps against the foundation greater than 1/16 inch and notch to match roof panel configuration at the eave.
 7. Cut panels square at each end.
 8. Cut panels square at each end; provide base trim at sill and closure plugs.
 9. The KXL paint system is a PVDF finish applied to the zinc or zinc aluminum coated steel to give a long life color that resists fading and chalking. KXL is a 1 mil nom. PVDF finish with 70 percent Kynar 500 or Hylar 5000 standard.
 10. Certification includes IAS Miami-Dade County Florida product approval.

2.07 INSULATION

- A. Schedule:

1. Roof insulation: Nominal values:
 - a. Building R-value: 30 – see wall sections.
 2. Wall Insulation: Nominal values:
 - a. R-value: 19 - see wall sections.
- B. Thermal Blocks required High density, expanded polystyrene, for installation over the purlin.

2.08 WALL ACCESSORIES

- A. Wall Openings: Cold-formed sheet metal framing concealed with manufacturer's standard colored trim.

2.09 ROOF ACCESSORIES

- A. Eave Gutters: Roll-formed 26 gage steel sheet, with gutter straps, fasteners and joint sealant; manufacturer's standard color.
1. Downspouts: 29 gauge 4 inches by 5 inches in 10 foot lengths, with downspout elbows and downspout straps; same color as wall panels unless specified otherwise.

2.10 MATERIALS

- A. Structural Steel Plate, Bar, Sheet, and Strip for Use in Bolted and Welded Constructions: ASTM A 572/A 572M, A 529/A 529M, A 1011 or A 36/A 36M Modified 50, with minimum yield strength of 55,000 psi (380 MPa).
- B. Galvanized Structural Steel Material for Use in Roll Formed or Press Broken Secondary Structural Members: ASTM A 563, with minimum yield strength of 60,000 psi (410 MPa).
- C. Galvanized Steel Sheet for Roll Formed or Press Broken Roof and Wall Coverings, Trim and Flashing: ASTM A 653/A 653M, with minimum yield strength of 50,000 psi (345 MPa).
- D. Galvalume Steel Sheet Used in Roll Formed or Press Broken Roof Covering: Aluminum-zinc alloy-coated steel sheet, ASTM A 792/A 792M, with minimum yield strength of 50,000 psi (345 MPa); nominal coating weight of 0.5 oz per sq ft (152 kg/sq m) both sides, equivalent to an approximate coating thickness of 0.0018 inch both sides.
- E. Hot Rolled Steel Shapes: W, M and S shapes, angles, rods, channels and other shapes; ASTM A 500, ASTM A 572/A 572M or ASTM A 36/A 36M as applicable; with minimum yield strengths required for the design.
- F. Structural Bolts and Nuts Used with Primary Framing: High strength, ASTM A 325 bolts and ASTM A563 Grade C nuts.

- G. Bolts and Nuts Used with Secondary Framing Members: High Strength ASTM A 325 Bolts and ASTM A 563 Grade C nuts.
- H. Panel Fasteners:
1. For Galvalume and KXL finished roof panels: Stainless steel-capped carbon steel fasteners with integral sealing washer.
 2. For wall panels: Coated carbon steel.
 3. Color of exposed fastener heads to match the wall panel finish.
 4. Concealed Fasteners: Self-drilling type, of size as required.
 5. Provide fasteners in quantities and location as required by the manufacturer.
- I. Flashing and Trim: Match material, finish, and color of adjacent components. Provide trim at rakes, including peak and corner assemblies, high and low eaves, corners, bases, framed openings and as required or specified to provide weathertightness and a finished appearance.
- J. Plastic Parts: Glass fiber reinforced resin or thermoformed ABS (Acrylonitrile-Butadiene-Styrene).
1. ABS: Minimum 1/8 inch thick.
 2. Color: Manufacturer's standard color.
- K. Sealants, Mastics and Closures: Manufacturer's standard type.
1. Provide at roof panel end laps, side laps, rake, eave, transitions and accessories as required to provide a weather resistant roof system; use tape mastic or gun grade sealant at side laps and end laps.
 2. Provide at wall panel rakes, eaves, transitions and accessories.
 3. Closures: Formed to match panel profiles; closed cell elastic material, manufacturer's standard color.
 4. Tape mastic: Pre-formed butyl rubber-based, non-hardening, non-corrosive to metal; white or light gray.
 5. Gun grade sealant: Non-skinning synthetic Elastomeric based material; gray or bronze.

2.11 FABRICATION

- A. Fabrication: Fabricate according to manufacturer's standard practice.
1. Fabricate structural members made of welded plate sections by jointing the flanges and webs by continuous automatic submerged arc welding process.
 2. Welding operators and processes: Qualified in accordance with AWS D1.1.
 3. Field connections: Prepare members for bolted field connection by making punched, drilled, or reamed holes in the shop.
- B. Component Identification: Mark all fabricated parts, either individually or by lot or group, using an identification marking corresponding to the marking shown on the shop drawings, using a method that remains visible after shop painting.

2.12 FINISH

A. Schedule of Finishes:

See Architectural Plan Sheets.

B. Shop Coat: Manufacturer's standard rust inhibitive primer paint; manufacturer's gray primer.

1. Finish all structural steel members using one coat of manufacturer's standard shop coat, after cleaning of oil, dirt, loose scale and foreign matter.

C. KXL Pre-Painted Finish (or equivalent): 1 mil 70 percent Kynar 500, Hylar 5000 coating on exterior surface.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper and or timely completion.

1. Verify foundations are properly installed, to correct dimensions and within acceptable tolerances.
2. Verify location of covered or built-in work.
3. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Framing Erection: Erect framing in compliance with AIS Specification and the latest edition of the MBMA metal building systems manual.

B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as required by manufacturer.

3.03 ERECTION OF FRAME

A. Install in accordance with manufacturer's instructions.

B. Do not erect frames without complete installation of tie beams and anchorages.

C. Set column base plates with non-shrink grout to full plate bearing.

D. Do not field cut or alter structural members without written approval.

E. After erection, prime bolts, welds, abrasions, and surfaces not primed with primer used in shop painting.

3.04 INSTALLATION OF WALL AND ROOF SYSTEM

- A. Install in compliance with manufacturer's instructions.
- B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.
- C. Fasten cladding system to structural supports, aligned level and plumb.
- D. Locate end laps over supports. End lap panels according to manufacturer's recommendations. Place sidelaps over adjacent panel and mechanically seam or stitch fastener per erection guidelines.
- E. Provide expansion joints where indicated.
- F. Use concealed fasteners.
- G. Install sealant and gaskets to prevent weather penetration.
- H. Install system free of rattles, noise due to thermal movement, and wind whistles.
- I. Install door frames, service doors, overhead doors, window and glass, and gutter system in compliance with manufacturer's instructions.
- J. Seal wall and roof accessories watertight and weathertight with sealant in compliance with building manufacturer's standard procedures.
- K. Rigidly support and secure gutters and downspouts. Joint lengths with formed seams sealed watertight. Flash and seal gutters to downspouts.
- L. Tolerances:
 - 1. Framing Members: 1/4 inch from level; 1/8 inch from plumb.
 - 2. Racking: 1/8 inch from true position. Provide shoring to maintain position prior to cladding installation.

3.05 FIELD QUALITY CONTROL

- A. Testing by Contractor:
 - 1. Roof installation inspection by roof manufacturer's representative; as required as part of warranty provision.
- B. Testing by Special Inspection:
 - 1. High Strength Bolted Connections: Specification for Structural Joints Using ASTM A 325 or A 490 Bolts, with minimum testing of bolted connections per the arbitration inspection procedure.

2. Welded Connections: AWS. Visual inspection of 100 percent of welds. Ultrasonic inspection of 50 percent of full and partial penetration welds. A rejection rate greater than 5 percent will increase the inspection to 100 percent.
3. General Testing: For materials and installed tolerances.

END OF SECTION

I. SECTION 13123 – GREENHOUSE SYSTEMS

A. PART 1 – GENERAL

1.1 Documents

- a. Drawing C-14273
 - b. Drawing C-14273A
 - c. Drawing C-14273B
- Attached at end of specification

1.2 Description

- a. The greenhouse shall be a CS3 manufactured by Stuppy Greenhouse Manufacturing, Incorporated in North Kansas City, Missouri.
- b. The greenhouse shall be furnished and installed according to specifications and drawings.
- c. Greenhouse dimensions are 30 feet wide by 60 feet long. Dimensions are center of posts to center of posts. Call if exact outside dimensions are needed.
- d. No equipment or materials should be ordered or fabricated prior to approval of shop drawings.
- e. If another model of greenhouse is substituted, the manufacturer shall apply for permission to quote 14 days prior to bid date and submit sufficient shop drawings to the owner (architect) for written approval prior to bid.

1.3 Plans and Submittals

- a. Design Criteria
 - 1. Greenhouse frame shall be designed to meet local building code.
 - 2. Provide structural prints and calculations sealed by a registered professional engineer in the state of Kentucky.
 - 3. Provide complete shop drawings, including the placement of equipment, covering, and doors.
 - 4. Design shall include concrete pad and all applicable foundation design for structure.

1.4 Erection of Greenhouse

- a. A qualified greenhouse specialty greenhouse contractor approved in writing by the manufacturer shall erect the greenhouse.
- b. The General Contractor shall have all site conditions correct and ready prior to greenhouse erection.
- c. No masonry, foundation or footer installation shall be done prior to approval of greenhouse plans.
- d. A drop trailer should be used for the duration of the project to provide a secure site/work trailer.

PART II – MATERIALS AND EQUIPMENT

2.1 Structure

- a. Approved manufacture is Stuppy Greenhouse Manufacturing, Incorporated – 1212 Clay, North Kansas City, and Missouri 64116 – (800) 733-5025.
- b. The greenhouse will be a 30' x 60' CS3 with 12' column and truss spacing as designated by local code.
- c. Sidewall height shall be 10 feet.

2.2 Components

- a. Primary Structural Steel Members
 - 1. All steel members shall comply with ASTM A500 dimensional tolerances.
 - 2. Columns shall be fabricated from 4 inch by 2 inch steel with minimum yield strength of 50,000 psi. Columns will be manufactured with 10" x 10" base plates. Hot dipped galvanized after manufacturing. Includes hilti epoxy, hilti epoxy gun, and threaded rod for installation.
 - 3. Truss top cords will be fabricated from 3 inch by 2-inch steel with minimum yield strengths of 50,000 psi.
 - 4. Truss bottom cords will be fabricated from 3 inch by 2-inch steel with minimum yield strengths of 50,000 psi.
 - 5. Truss webbing will be fabricated from steel with minimum yield strengths of 50,000 psi. Truss webbing will be attached to top and bottom cords with aluminum connections to enhance corrosion resistance. (Standard is 1.5" square tubing)
 - 6. Roof purlins will be 3 inch by 2-inch steel. Purlins will have a bolted connection to trusses.
 - 7. Endwalls will be framed with 3 inch by 2-inch rectangular steel tubing with minimum yield strength of 50,000 psi.
 - 8. Gutters are to be extruded aluminum
 - 9. No wood members are required or allowed to complete structure.
 - 10. No rolled form pipe or round columns allowed.

2.3 Doors and Door Frames

- a. Doors to be (2) 42 inches wide by 84 inches tall steel insulated ADA approved doors.
- b. Lock sets are to be included in hardware package.
- c. 24"x24" Tempered glass window installed in each door.
- d. Doors are ADA compliant.
- e. Doors to include heavy duty closer and lock plate.
- f. All doors should be furnished with appropriate framing and hardware. One door is to be installed on sidewall.

2.4 Ventilation Equipment

- a. Horizontal Air Flow Fans – Acme 20" 1/15hp fans. Quantity of 4 to be installed.
- b. Exhaust Fans – American Coolair AL Series - Quantity of (2) Two
 - 1. Fans must include automatic shutters, inlet/outlet guards, slant wall housings and belt tighteners.
 - 2. Exhaust fans are to be all aluminum fan & fan blades.
 - 3. Steel propeller fans are not acceptable.
 - 4. Provide 2 ea. AL-48K (3/4 hp) one fan is to be a two speed 115v and one is single speed 115v/230v.
- c. Inlet Vents and Vent Operators
 - 1. A single run of vents shall be made up of a top rail and bottom rail of extruded aluminum and bolted together in accordance with manufacturer instructions. All vents shall have provisions made at the hinge point to prevent creeping of the vents. Vent size to be 4 foot tall and 25 foot long. Vent opener to be manufactured by Wadsworth Controls – VC2000 ILS 3rpm motor/gearbox with LST (master) vent control/override control. Unit is fully UL compliant.
 - 2. Motorized Inlet Shutter LRW39E 39" x 39" inlet shutters are to be provided, Shutter's to be installed in the upper gable of structure. Motor and linkage to operate shutters (s) is to be included. Shutters and motor/linkages are to be manufactured by American Coolair.

2.5 Heating Equipment

- a. Greenhouse is to be equipped with (2) Two Modine PTP175 power vented heaters.
- b. Heaters are to have stainless steel burners and exchangers.
- c. Heaters with aluminum heat exchangers are not acceptable.
- d. Stacking is to be included as well as appropriate heater hangers to mount the heaters.
- e. Heaters are sized for 65 degree rise over outside temperature.

2.6 Cooling Equipment

- a. Evaporative pad system will consist of pads made of cross-fluted cellulose paper; distribution pipe and return system complete with pump.
- b. Distribution and return system to be American Coolair 6" Open Top PVC System.
- c. System is 4' tall x 25' long with 6" thick cooling pads.
- d. No wood support stringers are allowed.

2.7 Environmental Controls

- a. Wadsworth Step UP automatic control system capable with a minimum of two stages of heating, set point, and four stages of cooling. Controller is to be complete with contractor panel and wiring diagram.
- b. Thermostat control is not acceptable.

2.8 Covering Material

- a. Roof, sides, and ends to be covered with 8mm twinwall clear polycarbonate.
- b. Polycarbonate panels are to be of virgin resin. Regrind is not acceptable.
- c. Polycarbonate panels must carry a minimum warranty of 15 years against yellowing.
- d. All extrusions are to be aluminum.

2.9 Benches

- a. Sidewall Benches: To have two (2) 4' wide x 48' long Above Ground Benches.
- b. Center Benches: To be eight (8) 6' wide x 8' long benches. Above Ground Benches.
- c. Bench framing is 1.5" square on posts, bench rail is 1.315 galvanized steel with aluminum perimeter extrusion. Durabench plastic panels for bench top surface. Above ground benches.

2.10 Shade Cloth.

- a. Exterior shade cloth size 34' x 60'. 50% of shade to cover roof of greenhouse. Shade cloth is to be Svensson Harmony 5120 O E Taped & Grommited 3'o.c. on all sides. Includes attachment hardware.

2.11 Irrigation System/Hanging Basket Rails

- a. Irrigation system to include (1) one each 9 station controller, (1) one each Electronic Leaf Controller and a Dosmatic Advantage 30 fertilizer injector. To have 5 zones of irrigation on benches. Outside benches to have multi outlet drippers. One of the outside benches is to have 20' (length) for propagation zone (overhead mister drops) operated by electronic leaf.
- b. Includes 4 runs of hanging basket rails 60' long. Controlled as 1 zone.
- c. Includes all PVC, back flow preventer and check valves to comply with local codes.

PART III – EXECUTION

3.1 Warranty

- a. Greenhouse shall have a warranty period of one year for defects of structural and glazing installation. Equipment in the greenhouse will carry the manufacturer's standard warranty for parts. Covering will also carry the manufacturer's standard warranty.

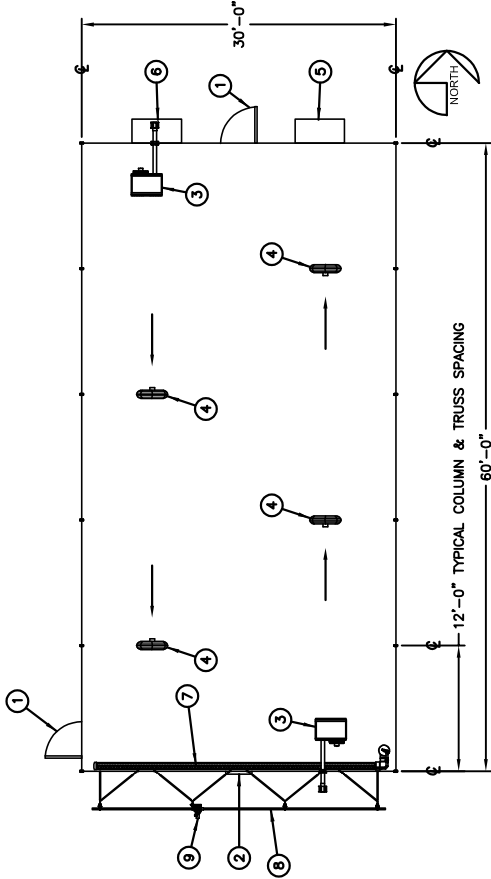
3.2 Instruction

- a. Approved representative of the greenhouse manufacturer to visit the job site a minimum of one-time during construction to meet with building erectors and once after construction to meet with the owner for training. 3 sets of owners/operation manuals to be provided.

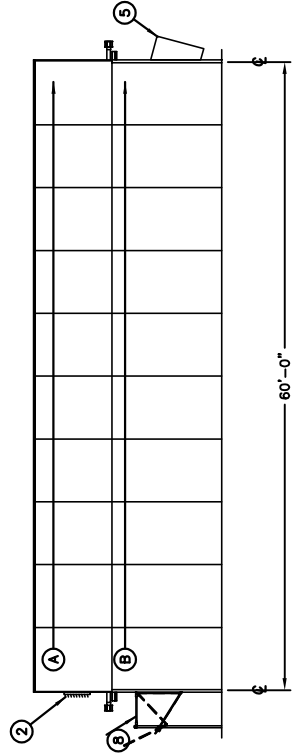
ITEM #	MATERIAL LIST - PART DESCRIPTION	QTY
1	1953 42" STEEL DR INS'D VUE-LIGHT, HANDICAP	2
2	330814 SHUTTER 39" X 39"ID DOUBLE	1
3	5214SS SEPT775S HEATER NG 115V	2
4	32905 ACME HAF 20A4 FAN 1/15HP-1	4
5	330836 AL48K 115/230 PKG 3/4HP, W REAR GUARD	1
6	330854 AL48K 2SP 115 PKG 3/4HP, W REAR GUARD	1
7	330757 PVC OT 6" X 25" D&R W CMN PARTS	1
8	1918 48" RIGID VENT SYS 1-1/4" DR	25FT
9	34516 WW VC100A ILS LST 1-5/8"OD SHAFT	1

ITEM #	MATERIAL LIST - PANEL DESCRIPTION	QTY
A	233175 GREENTEX 8MM 71.25" x 16'-6"	20
B	233175 GREENTEX 8MM 71.25" x 11'-0"	20
C	233175 GREENTEX 8MM 71.25" x 14'-0"	4
D	233175 GREENTEX 8MM 71.25" x 17'-0"	4
E	233175 GREENTEX 8MM 71.25" x 18'-6"	2

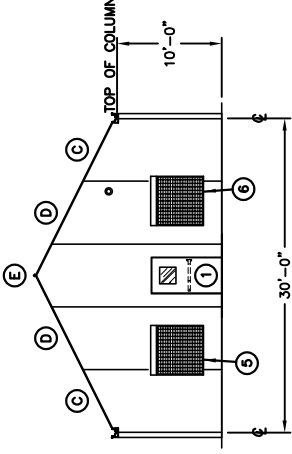
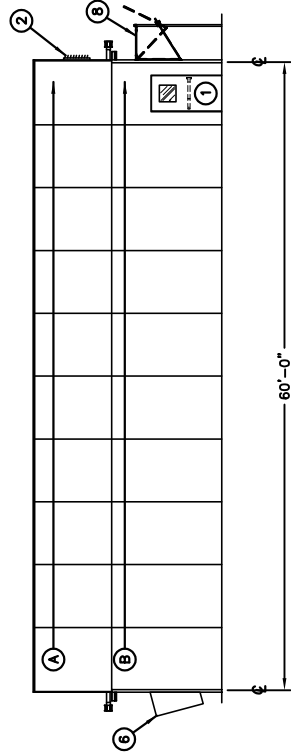
NOTES:
 1. CHECK WITH CUSTOMER FOR EXACT LOCATION OF DEVICES AND ALL EQUIPMENT.
 2. REFER TO ENDWALL FRAMING DRAWINGS FOR ASSEMBLY OF ENDWALLS.
 3. IN THE EVENT OF UNINTENDED CONFLICT OF EQUIPMENT PLACEMENT & CODE STRUCTURE, WHEN APPLICABLE, PRIORITY WILL BE GIVEN TO CODE STRUCTURE.



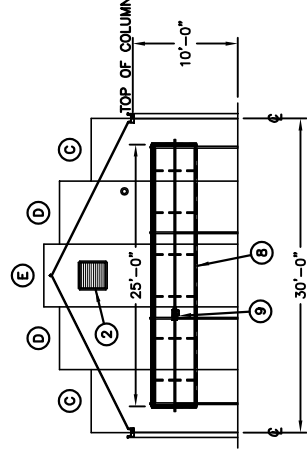
PLAN VIEW



SIDE ELEVATIONS



END ELEVATIONS



RUSSELL AGRITECH TRAINING CENTER

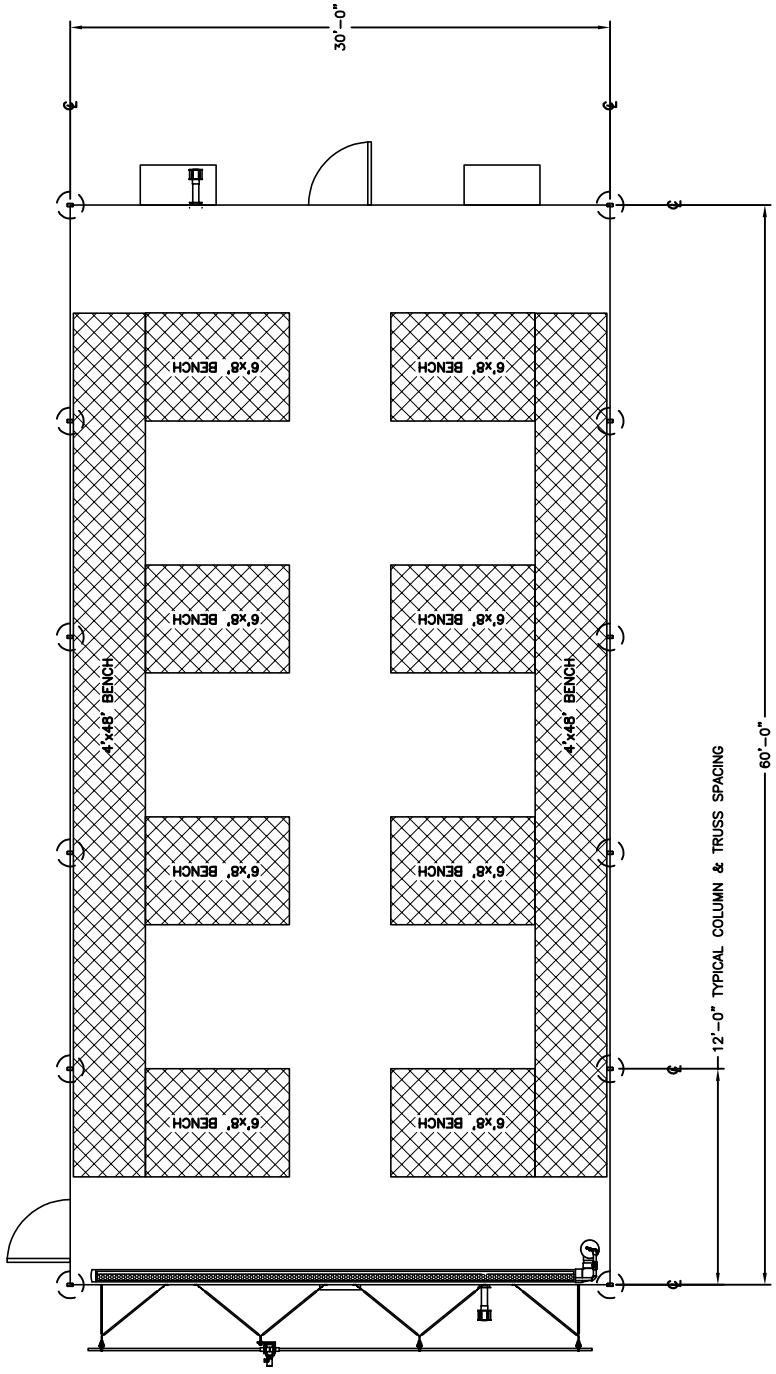
PROJECT #

ISSUE DATE
02/13/2019
REVISIONS

DRAWN
SMP
CHECKED
TNB
SHEET

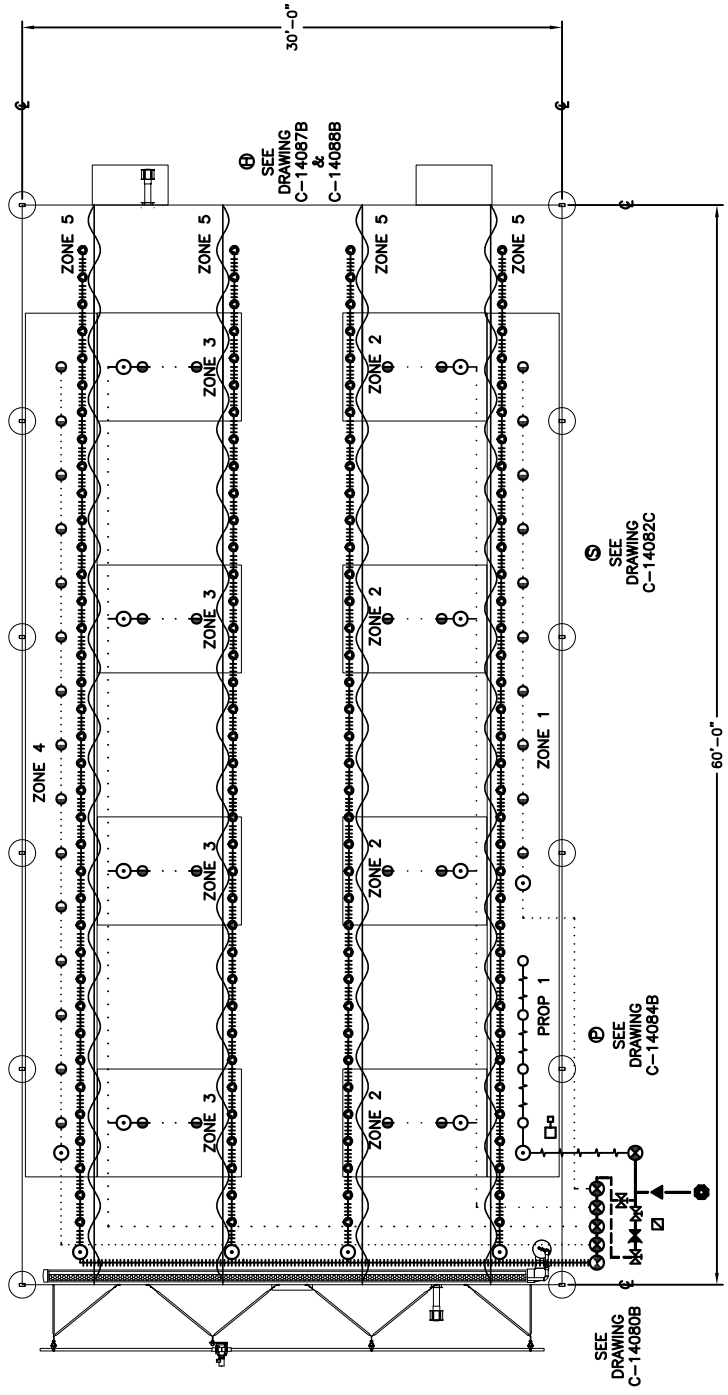
C-14273
EQUIPMENT LAYOUT

Good to know.
Stuppy
 Greenhouse Design, Manufacturing & Construction
 1217 Clay Street - PO Box 12456
 North Kansas City, MO 64116
 816.842.3071 www.stuppy.com



PLAN VIEW

- NOTES:
- 1) CHECK WITH CUSTOMER FOR EXACT LOCATION OF DOORS AND ALL EQUIPMENT.
 - 2) REFER TO ENDWALL FRAMING DRAWINGS FOR ASSEMBLY OF ENDWALLS.
 - 3) IN THE EVENT OF UNINTENDED CONFLICT OF EQUIPMENT PLACEMENT & CODE STRUCTURE, WHEN APPLICABLE, PRIORITY WILL BE GIVEN TO CODE STRUCTURE.



PLAN VIEW

- | | | |
|--|---|--|
| <p>● HANGING BASKETS</p> <p>● SPRINKLERS</p> <p>● PROPAGATION</p> <p>● #640203 SOLENOID VALVE ASSEMBLY</p> <p>○ SHUT OFF VALVE</p> <p>□ #7094 RAIN DIAL 600 AUTOMATIC CONTROLLER</p> <p>▼ BACKFLOW PREVENTOR</p> | <p>● WATER SOURCE</p> <p>✕ #95183 FERTILIZER INJECTOR</p> <p>✕ BALL VALVE</p> <p>□ #7060 ELECTRONIC LEAF CONTROLLER</p> <p>○ #609315 NETAFIM, MICRO-SPRINKLER BLUE (3'0.C.)</p> <p>● #6009311 NETAFIM, SPRINKLER GREEN (3'0.C.)</p> <p>● #609308 NETAFIM, DRIPPER W/WEIGHT ASSEMBLY (1'-6"0.C.)</p> | <p>~~~~~ HANGING BASKET SUPPORT PIPE</p> <p>--- MAIN WATER SUPPLY LINE</p> <p>--- PROP 1</p> <p>--- ZONE 1</p> <p>--- ZONE 2</p> <p>--- ZONE 3</p> <p>--- ZONE 4</p> <p>+++++ ZONE 5</p> |
|--|---|--|

SECTION 210000 - FIRE PROTECTION SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of fire protection systems work is as indicated on the Drawings to suppress the upper floor level for the Head Start program and to suppress the new elevator addition. The building to be suppressed with a wet pipe system, with the attached barn/livestock area suppressed with a dry pipe system. Areas to be suppressed are to be covered 100% per NFPA-13 as indicated on Drawings. General classification for areas suppressed is Light Hazard. The gas to be used in the small dry-pipe piping system may be compressed air.
- B. Before submitting bid, examine all Mechanical, Architectural, and Structural Drawings, visit the site and become acquainted with all conditions that may, in any way whatsoever, affect the execution of this work. Also, this Contractor shall coordinate with the water utility as to the adequacy of water supply for the proposed sprinkler system.
- C. Furnish all material, labor, tools, equipment and supervision required for installation of a complete fire protection stand pipe system and limited area fire protection system as indicated on the project drawings. Include all necessary piping, sprinkler heads, test connections, valves, drains, fire department connections, etc.
- D. The Contractor shall provide flushing and sterilization of all water lines in accordance with current Kentucky Plumbing Codes, Rules and Regulations and shall make connection to domestic water mains in accord with current rules and regulations of the State Department of Sanitary Engineering and Division of Water Quality.
- E. Piping systems shall be hydraulically sized based tests performed at the fire riser.

1.2 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacturer of fire protection piping systems products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: A firm with at least 5 years of successful installation experience on projects with fire protection piping systems work similar to that required for project.

- C. Local Fire Department/Marshall Regulations: Comply with governing regulations pertaining to fire sprinkler piping.

1.3 SUBMITTALS:

- A. Shop Drawings: Submit scaled layout drawings for fire protection pipe and fittings including, but not necessarily limited to, pipe and tube sizes, locations, elevations and slopes of horizontal runs, wall and floor penetrations, and connections. Show interface and spatial relationship between piping and proximate equipment. Prepare detailed design of system in accordance with all local and national codes and the following guidelines.
- B. Complete shop drawings shall be submitted to the State Fire Marshall office for approval. No work shall proceed until shop drawings are approved. Indicate all information required for review by NFPA-13.
- C. The Contractor shall submit these drawings to the Engineer through the General Contractor and Architect. The Engineer will review these drawings and will return these back to the Contractor. It is the Contractor's responsibility to correct any comments and to submit the reviewed drawings to the fire marshal's office for their review and approval. No work shall be done until drawings are approved by the authority having jurisdiction.
- D. All equipment, devices and materials included in the installation shall be approved or listed by Underwriters' Laboratories or other nationally recognized testing laboratories.

PART 2 - PRODUCTS

2.1 FIRE PROTECTION PIPING MATERIALS AND PRODUCTS:

- A. Pipe & Fittings
 - 1. Interior Piping:
 - a. Up to 2" (Interior) Schedule 40 ASTM A-53 black steel; 175# cast iron screwed fittings or Schedule 10, ASTM A-135 black steel with victaulic or similar type approved fittings.
 - b. 2½" and larger (Interior) Schedule 40 black steel with flanged, welded or victaulic (or similar) type approved fittings or Schedule 10, ASTM A-135 black steel with victaulic or similar type approved fittings.
 - 2. Exterior Piping:

- a. Equal to "Blue Brute" Class 305 PVC piping, SDR-14, for exterior fire protection piping. Piping shall meet AWWA C900 requirements, be UL listed, Factory Mutual approved and NSF approved. Joints shall have spigot pipe ends with a flexible elastomeric ring seated in a groove to provide water tight seal. Minimum burst pressure to be 800 PSI when tested in accordance with ASTM D1599. No. 8 copper wire (tracer wire) shall parallel all exterior PVC pipe.

B. Sprinkler Head Cabinet:

1. Furnish and install a cabinet, clearly labeled, with five (5) sprinklers of each type complete with required wrenches. Locate as directed by Engineer. Label "Sprinkler Heads".

C. Fire Department Connection:

1. Furnish and install a fire department connections with threads as approved by the local fire department; cast brass polished and chromium plated; with connection sizes and lettering as directed by the local authority having jurisdiction; Viking, Automatic Sprinkler Corporation, Potter-Roemer or approved equivalent. Connection shall be simplex or duplex as required by the local fire department. Ensure size and type of threads matches that of the serving fire department.

D. Fire Hydrant:

1. Fire Hydrants: Provide fire hydrants as indicated of dry-barrel type with compression-type main valve, conforming to ANSI/AWWA C502. Equip with breakaway safety flange. Provide 3-way type with two 2½" nozzles and one 4" pumper nozzle, each having threads in accordance with local fire department requirements. Provide 5¼" main valve with 6" slip-on joint inlets. Provide 1½" pentagon operating nut, 1 piece bronze. Provide positive drain valve and openings designed as integral part of main valve assembly.
2. NOTE: The listed requirements for fire hydrants are not to replace those of the local authority, if such requirements have been determined by that authority. Coordinate fully all requirements to match the dictates of the municipality.

E. Double Detector Check Valve:

1. Furnish and install a double detector check valve assembly at water meter vault as required by the local authority and the water utility. It shall be listed and approved by Underwriter Laboratories and Associated Factory

Mutual Laboratories; 175# working pressure; IBBM; flanged; equivalent to Ames, or Grinnell.

F. Flow Indicator Switches:

1. Furnish and install flow indicator switches as required by NFPA 13. All flow indicator switches shall be UL approved. Coordinate with Fire Alarm System supplier/installer.

G. Air Pressure Maintenance Device

1. Furnish and install air pressure maintenance device (air compressor) next to dry-pipe system riser. Size in accordance with NFPA-13 for maintenance or required pressure in the dry pipe system piping. Air compressor shall be U.L. listed and rated for sprinkler service duty. Unit shall be 120 volt/ single phase with an air cooled motor and automatically resetting thermal protection. Air compressor shall be oil-less type; compressors which use oil lubrication on the compressed air side shall not be acceptable. Viking or other approved equal. Special Note: Contractor shall coordinate the size of the air compressor with the room available in the sprinkler room.
2. Provide compressed air system with pressure monitoring switch, integral pressure control, and pressure gauge. Provide resetting pressure relief to prevent system air pressure from exceeding 65 PSIG.
3. Alarm devices and accelerators for the sprinkler systems shall be provided for the supervision of low dry pipe system air pressure.

H. Dry Pipe Alarm Valve & Retard Chamber:

1. Dry-Pipe Valves: Provide cast-iron dry-pipe valves, differential type, 175 PSI working pressure.
2. Provide retard chamber as recommended by the manufacturer.

I. Tamper Switches for Water Shut-Off Valves

1. Furnish and install tamper switches where required by NFPA 13. All tamper switches shall be UL approved. Coordinate with fire alarm system supplier/installer. All tamper switches located in fire protection pits shall be waterproof, capable of operating beneath water and be NFPA approved.

J. Signs:

1. Appropriate code approved and required signs shall be installed on all control valves, drains, inspector's test, etc., indicating the function, installation, etc. Signs shall be neatly affixed with rust inhibitive screws, rivets or where hung from piping; with stainless steel No. 14 AWG wire. Refer also to Section regarding Mechanical Identification.
2. Provide building identification for the fire department connection to this building. Exterior fire department connection shall be stamped and painted metal; lamacoid plates for the fire department connections is not acceptable.

K. Check Valves:

1. 2½" and over; listed and approved by UL and FM; marked SV-FM; 175# working pressure; 1 BBM; flanged; equivalent to Mueller, Scott or Lunkenheimer.
2. 2" and under; 150# working pressure; bronze; screwed; equivalent to Jenkins, Scott or Lunkenheimer.

L. Inspection Test Connections & Pressure Gauges:

1. A 1" inspection test connection as required by the Kentucky Building Code. Discharge shall run to open air.
2. Control valve for test connection shall be installed not over 7' above the floor.
3. A pressure gauge at the inspection. Test connection at each location indicated on the Plans. Pressure gauges shall be 2½" diameter and readable from the floor.

M. Gate Valves:

1. 2½" and over; listed and approved by UL and FM; marked SV-FM; 175# working pressure; 1 BBM; OS&Y; flanged; cast iron discs; bronze seat rings; four point wedging mechanism; equivalent to Mueller, Scott or Lunkenheimer.
2. 2" and under; 150# working pressure; bronze; rising stem; screwed; bronze discs; bronze seat rings; two point wedging mechanism; equivalent to Jenkins, Scott or Lunkenheimer.

N. Sleeves and Escutcheon Plates:

1. Provide cast brass chrome plated split ring type escutcheons where piping penetrates walls, ceilings and floors, whether in finished areas or not.

O. Sprinkler Heads:

1. Grinnell, Star, Reliable, Viking, Central Sprinkler Corporation, or approved equivalent as follows:
2. Where piping is exposed: "Standard up right".
3. Where piping is concealed above finished ceilings, provide two piece, semi-recessed, Pendant sprinkler heads with removable escutcheon plates. All piping shall be concealed throughout.
4. Install sprinkler head guards where heads are subject to physical abuse. Heads located below seven (7) feet above floor, etc..
5. Sprinkler head degree ratings shall be determined by the area serviced in accord with current Codes and Standard Practices. Indicate degree ratings on submitted Shop Drawings.
6. Provide other types of heads as specified on the Drawings.
7. NOTE: "Omega" brand & Central Sprinkler Corporation sprinkler heads shall be prohibited.

P. Hangers:

1. All piping shall be adequately and permanently supported in an approved manner on approved hangers (Submit with drawings).

PART 3 - EXECUTION

3.1 SYSTEM DRAINAGE

- A. The entire Sprinkler System (except that part which is below grade and will not freeze) shall be installed so as to allow 100% drainage.
- B. All sprinkler branch piping shall be installed so as to drain back to the main riser. No piping shall be installed which will pool greater than 4 gallons of water without drainage capability.
- C. Approved 2" drain piping shall be provided on sprinkler risers with discharge piping running to nearest open air location on the exterior of the building. Where sprinkler piping is trapped, an approved auxiliary draw-off shall be provided and neatly installed.
- D. All drain valves shall have a metal tag labeled "Sprinkler Drain".

3.2 ADJUST AND CLEAN:

- A. Sprinkler Piping Flushing: Prior to connecting sprinkler risers for flushing, flush water feed mains, lead-in connections and control portions of sprinkler piping. After fire sprinkler piping installation has been completed and before piping is placed in service, flush entire sprinkler system, as required to remove foreign substances, under pressure as specified in ANSI/NFPA 13. Continue flushing until water is clear, and check to ensure that debris has not clogged sprinklers.

3.3 PAINTING/PRIMING

- A. The Contractor shall apply one (1) shop coat of rust inhibitive primer on all exposed sprinkler piping. After installing in place, piping exposed in occupied spaces (ie: stairwells, and perhaps other areas) shall be thoroughly cleaned so as to readily receive the finish coat specified in the Architectural Division of Painting. If the Architect does not choose a color, then the piping shall be painted to match the adjacent wall/ceiling areas.

3.4 FIELD QUALITY CONTROL:

- A. Hydrostatic Testing: After flushing system, test fire sprinkler piping with compressed air for a period of 2 hours, at not less Than 125 PSI. Repair or replace piping system as required to eliminate leakage in accordance with ANSI/NFPA standards for "little or no leakage", and retest as specified to demonstrate compliance.

END OF SECTION

210507- EXCAVATION, TRENCHING, AND BACKFILLING FOR FIRE PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. Excavation and Backfilling:

1. Do all excavation of all materials encountered including rock required for work under this section. Backfill all trenches, tamping well in 6" layers. System shall be tested, made tight and accepted before backfill. Remove from premises all excess material not used in backfilling.
2. Repair all streets, sidewalks, drives, paving, etc. damaged. Repair materials shall generally match existing construction. All backfilling and repairing shall meet all requirements of the city and others having jurisdiction. Repair work shall be thoroughly first class. All repair work in public road areas shall be done in accordance with Louisville Water Company details.
3. Extent of earthwork is to be determined from work indicated on the drawings.
4. Backfilling of trenches is included as part of this work.

1.2 QUALITY ASSURANCE:

- A. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

1.3 JOB CONDITIONS:

- A. Site Information: Complete data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity. It is expressly understood that Owner will not be responsible for interpretations or conclusions drawn from any available data. Classification of Rock: Unclassified.
- B. Should uncharted, or incorrectly charted piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
- C. Provide minimum of one week notice to Architect/Engineer and Owner, and receive written notice to proceed before interrupting any utility.
- D. Use of Explosives:

1. The use of explosives is not permitted.
- E. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post warning lights.
- F. Operate warning lights as recommended by authorities having jurisdiction. No trenches shall be left open without wood planks capable of supporting 250 pounds (one man) being placed over the open sections.
- G. Protect structures, utilities, retaining walls, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.
- H. Perform excavation within drip-line of large trees to remain by hand, and protect the root system from damage or dryout to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with burlap. Paint root cuts of 1" diameter and larger with emulsified asphalt tree paint.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 SOIL MATERIALS:

- A. Definitions:
 1. Suitable soil: Soil deemed suitable by the Architect.
 2. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, natural or crushed sand.
 3. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100% passing a 1½" sieve and not more than 5% passing a No. 4 sieve.
 4. Backfill and Fill Materials: Satisfactory soil materials free of clay, rock or gravel larger than 2" in any dimension, debris waste, frozen materials, vegetable and other deleterious matter.

3.2 EXCAVATION:

- A. Excavation consists of removal and disposal of material encountered when establishing required piping elevations.

- B. Excavation Classifications: The trenching and excavation specified in this section shall be Unclassified. All rock encountered in the installation of piping and conduits shall be removed at no increase in contract price.
- C. Dewatering: Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.
- D. 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. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
- E. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.
- F. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees.
- G. Dispose of excess soil material and waste materials as herein specified.
- H. Excavation for Trenches: Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room.
- I. Excavate trenches to depth indicated or required.
- J. Do not backfill trenches until tests and inspections have been made and backfilling authorized by Architect, Engineer and local authority having jurisdiction. Use care in backfilling to avoid damage or displacement of pipe systems.
- K. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35°F. (1°C).

3.3 COMPACTION:

- A. General: Control soil compaction during construction providing minimum percentage of density specified for each area classification.
- B. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum dry density for soils which exhibit a well-defined moisture density relationship determined in accordance with ASTM D 698; and not less than the following percentages of relative density, determined in accordance with ASTM D 2049, for soil which will not exhibit a well-defined moisture-density relationship.
- C. Compact top 6" of subgrade and each layer of backfill or fill material at 90% maximum

dry density.

- D. Moisture Control: When subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.
- E. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
- F. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by dicing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.4 BACKFILL AND FILL:

- A. General: Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.
- B. In excavations, use satisfactory excavated or borrow material.
- C. Under piping and conduit, use subbase material where subbase is indicated under piping or conduit; shape to fit bottom 90° of cylinder.
- D. Backfill excavations as promptly as work permits, but not until completion of the following:
- E. Inspection, testing, approval, and recording locations of underground utilities.
- F. Removal of shoring and bracing, and backfilling of voids with satisfactory materials.
- G. Removal of trash and debris.
- H. Placement and Compaction: Place backfill and fill materials in layers not more than 8" in loose depth for material compacted by heavy compaction equipment, and not more than 4" in loose depth for material compacted by hand operated tampers.
- I. Before compaction, moisten each layer as necessary to provide suitable moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

3.5 MAINTENANCE:

- A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- B. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality and condition of surface or finish to match adjacent work, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.6 DISPOSAL OF EXCESS AND WASTE MATERIALS:

- 1. Remove excess excavated material, trash, debris and waste materials and dispose of it off Owner's property.

END OF 220507

SECTION 220500 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS:

- A. All requirements under Division One and the General and Supplementary Conditions of these specifications shall be a part of this section. Each contractor shall be responsible to thoroughly familiarize himself with all its contents as to requirements which affect this division or section. The work required under this section includes all material, equipment, appliances, transportation, services, and labor required to complete the entire system as required by the drawings and specifications.

1.2 SCOPE

- A. The work included in this division consists of the furnishing of all labor, equipment, transportation, supplies, material, appurtenances and services necessary for the satisfactory installation of the complete and operating Plumbing System(s)/Equipment indicated or specified in the Contract Documents.
- B. Any materials, labor, equipment or services not mentioned specifically herein which may be necessary to complete or perfect any part of the Plumbing Systems in a substantial manner, in compliance with the requirements stated, implied or intended in the drawings and, or specifications, shall be included as part of this Contract.
- C. It is the intent of this Contract to deliver to the Owners a "like new" project once work is complete. Although plans and specifications are complete to the extent possible, it shall be the responsibility of the Contractors involved to coordinate all new systems with items of construction provided by others, and to relocate items which interfere with new equipment or materials required for the complete installation without additional cost to the Owner.

1.3 DEFINITIONS AND ABBREVIATIONS

- A. Contractor - Any Contractor whether proposing or working independently or under the supervision of a General Contractor and, or Construction Manager and who installs any type of mechanical work or, the General Contractor.
- B. Engineer - The Consulting Mechanical-Electrical Engineers either consulting to the Owners, Architect, other Engineers, etc.
- C. Architect - The Architect of Record for the project.

- D. Furnish - Deliver to the site in good condition and turn over to the Contractor who is to install.
- E. Provide - Furnish and install complete, tested and ready for operation.
- F. Indicated - Shown on the Drawings or Addenda thereto.
- G. Typical - Where indicated repeat this work, method or means each time the same or similar condition occurs whether indicated or not.
- H. OSHA - Office of Safety and Health Administration.
- I. NEC - National Electrical Code.
- J. NFPA - National Fire Protection Association.
- K. AGA - American Gas Association
- L. ASME - American Society of Mechanical Engineers.
- M. ANSI - American National Standards Institute.
- N. ASHRAE - American Society of Heating, Refrigeration and Air Conditioning Engineers.
- O. NEMA - National Electrical Manufacturers Association.
- P. UL - Underwriters Laboratories.

1.4 INSPECTION OF THE SITE:

- A. The contractor shall personally inspect the site of the proposed work and inform himself fully as to the conditions under which the work is to be done. Failure to do so will not be considered sufficient justification to request or obtain extra compensation over and above the contract price.

1.5 MATERIAL AND WORKMANSHIP:

- A. All material and apparatus shall be new and in first class condition. All workmanship shall be of the finest possible by experienced mechanics. All installations shall be made in a manner that will comply with applicable Codes and laws. In general, all materials and equipment shall be of commercial specification grade in quality.

1.6 DRAWINGS AND SPECIFICATIONS

- A. The drawings are diagrammatic only and indicate the general arrangement of the systems and are to be followed. If deviations from the layouts are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted to the Engineer for approval before proceeding with the work. The drawings are not intended to show every item that may be necessary to complete the systems. All proposers shall anticipate that additional items may be required and submit their bid accordingly.
- B. Each Contractor shall make all his own measurements in the field and shall be responsible for correct fitting. He shall coordinate this work with all other branches of work in such a manner as to cause a minimum of conflict or delay.
- C. The Engineer shall reserve the right to make adjustments in location of piping, ductwork, equipment, etc. where such adjustments are in the interest of improving the project.
- D. Unless dimensioned, the mechanical drawings only indicate approximate locations of equipment, piping, etc.. Dimensions given in figures on the drawings shall take precedence over scaled dimensions and all dimensions, whether given in figures or scaled, shall be verified in the field to insure no conflict with other work.

1.7 COORDINATION:

- A. Coordinate all work with that of other trades so that the various components of the systems will be installed at the proper time, will fit the available space, and will allow proper service access to those items requiring maintenance. Any components which are installed without regard to the above shall be relocated at no additional cost to the owner.
- B. It is the Contractor's responsibility to provide materials with trim which will fit properly the types of ceiling, wall, or floor finishes actually installed. Model numbers in specifications or shown on drawings are not intended to designate the required trim.

1.8 ORDINANCES AND CODES:

- A. Comply with National Fire Protection Association codes, Kentucky Building Code, Kentucky Plumbing Code, and/or all other applicable codes and ordinances. Obtain and pay for all permits. Contractor shall be held responsible for any violation of the law.
- B. The Contractor shall give all necessary notices, obtain and pay for all permits, government sales taxes, fees, inspections and other costs, in connection with his work. He shall also file all necessary plans, prepare all documents and obtain all necessary approvals of all governmental departments having any jurisdiction, whether indicated or

specified or not.

- C. The contractor shall also obtain all required certificates of inspection for his work and deliver same to the Engineers before request for acceptance and final payment for the work.

1.9 PROTECTION OF EQUIPMENT:

- A. Adequately protect equipment from damage after delivery to job. Cover with heavy polyethylene plastic as required to protect from plaster, dirt, paint, water, or physical damage. Equipment which has been damaged by construction activities will be rejected, and contractor is obligated to furnish new equipment of a like kind.
- B. Keep premises broom clean at all times from foreign material created under this contract. All piping, equipment, etc. shall have a neat and clean appearance at the termination of the work.

1.10 EQUIPMENT AND MATERIALS SUBSTITUTIONS OR DEVIATIONS

- A. When any Contractor requests approval of materials and/or equipment of different physical size, capacity, function, color, access, it shall be understood that such substitution, if approved, will be made without additional cost to anyone other than the Contractor requesting the change regardless of changes in connections, space requirements, electrical characteristics, etc. from that indicated, electrical service, etc.. In all cases where substitutions affect other trades, the Contractor requesting such substitutions shall advise all such Contractors of the change and shall renumerate them for all necessary changes in their work.
- B. NOTE: Any drawings, Specifications, Diagrams, etc., required to describe and coordinate such substitutions or deviations shall be professionally prepared at the responsible Contractor's expense. Review of Shop Drawings by the Engineers does not in any way absolve the Contractor of this responsibility.
- C. Notwithstanding any reference in the specifications to any article, device, product, material, fixture, form, or type of construction by name, make or catalog number, such reference shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition; any devices, products, materials, fixtures, forms, or types of construction which, in the judgment of the Engineer, are equivalent to those specified are acceptable, provided the provisions of the paragraph immediately preceding are met. Requested substitutions shall be submitted to the Engineer a minimum of five days prior to bids.

1.11 SUPERVISION OF WORK

- A. Each Contractor shall personally supervise the work for which he is responsible or have a competent superintendent, approved by the Engineers, on the work at all times during progress with full authority to act for him.

1.12 SHOP DRAWINGS:

- A. Submit for approval eight sets of manufacturers shop drawings of all major items of equipment and all items requiring coordination between contractors. Before submitting shop drawings and material lists, the contractor shall verify that all equipment submitted is mutually compatible and suitable for the intended use, and shall fit the available space and allow ample room for maintenance. The Engineer's checking and subsequent approval of such shop drawings shall not relieve the contractor from responsibility for errors in dimensions, details, size of members, or quantities; or omissions of components or fittings; or for coordinating items with actual building conditions. Provide any needed wiring diagrams.
- B. Catalog data must have the item or model number clearly marked and all accessories indicated. Mark out all inapplicable items.
- C. NOTE: Any shop drawings received without being reviewed and stamped by the Contractor shall be returned Rejected without review.

1.13 OPERATION AND MAINTENANCE INSTRUCTIONS:

- A. Submit to the architect four (4) copies each of material for maintenance and operation instruction manuals, appropriately bound into manual form including approved copies of the following, revised if necessary to show system and equipment as actually installed:
 - 1. Manufacturers Catalog Sheets
 - 2. Wiring Diagrams
 - 3. Maintenance Instructions
 - 4. Recommended Maintenance Schedules and Timelines
 - 5. Operating Instructions
 - 6. Parts Lists
 - 7. Preventative Maintenance Recommendations
- B. All binders shall be as per the applicable Division I General Specifications.

1.14 GUARANTEE:

- A. Each Contractor shall guarantee all equipment, apparatus, materials, and workmanship

entering into this Contract to the best of its respective kind and shall replace all parts at his own expense, which are proven defective for a duration as indicated in the Division I General Conditions and Specifications.

- B. Where such duration is not identified, then guarantee shall be for one year from final acceptance of the work by the Engineer/Architect. The effective date of completion of the work shall be the date of the Engineer's (Architect's) Statement of Substantial Completion. Items of equipment which have longer guarantees, as called for in these specifications, shall have warranties and guarantees completed in order, and shall be in effect at the time of final acceptance of the work by the Engineer. The Contractor shall present the Engineer with such warranties and guarantees at the time of final acceptance of the work. The Engineer shall then submit these warranties, etc. to the Owner. Refer to other sections for any special or extra warranty requirements.

1.15 CONDUCT OF WORKMEN

- A. Each Contractor shall be responsible for the conduct of all workmen under his supervision. Misconduct on the part of any workman to the extent of creating a safety hazard, or endangering the lives and property of others, shall result in the prompt relief of that workman. The consumption of alcoholic beverages or other intoxicants, narcotics, barbiturates, hallucinogens or debilitating drugs on the job site is strictly forbidden.

1.16 ROUGH-IN:

- A. Coordinate without delay all roughing-in with general construction. All piping, conduit, rough-in shall be concealed except in unfinished areas and where otherwise shown.

1.17 CUTTING AND PATCHING:

- A. Each Mechanical Contractor shall be responsible for all openings that he may require in floors, roofs, ceilings, walls, etc., and shall coordinate all such work prior to execution. Improperly located openings shall be reworked at the expense of the responsible Contractor.
- B. Each Mechanical Contractor shall be responsible for properly shoring, bracing, supporting, etc., any existing and/or new construction to guard against cracking, settling, collapsing, displacing or weakening while openings are being made. Any damage occurring to the existing structure, due to failure to exercise proper precautions or due to action of the elements shall be promptly and properly made good to the satisfaction of the Architect and Engineer.
- C. Patching and repairing made necessary by work performed under this division shall be included as a part of the work and shall be done by skilled mechanics of the trade or trades

for work cut or damaged, of like type to match adjacent surfaces and in a manner acceptable to the Architect & Engineer.

- D. Where the installation of conduit, ducts, piping, etc. requires the penetration of fire or smoke rated walls, ceilings or floors, the penetrations MUST be made using a U.L. listed through penetration assembly. These materials must be U.L. listed as a recorded assembly and shall be submitted for approval prior to use.
- E. Piping passing through floors, ceilings and walls in finished areas, unless otherwise specified, shall be fitted with chrome plated brass escutcheons of sufficient outside diameter to amply cover the sleeved openings and an inside diameter to closely fit the pipe around which it is installed.

1.18 LINTELS

- A. The Mechanical Contractor shall provide lintels for all masonry bearing openings required for the mechanical work (Louvers, wall boxes, duct penetrations, etc.). Lintels shall be sized as indicated by the structural drawings and specifications. Coordinate requirements with the general contractor and the Structural Engineer. Contact Engineer for additional direction if necessary. Plan all lintel depths to ensure maintenance of all Architectural ceiling levels. Also, plan all required angles for fire damper and UL listed sleeves for a total depth for coordination with ceiling heights. No cutting is to be done at points or in a manner that will weaken the structure and unnecessary cutting must be avoided. If in doubt, contact the Structural Engineer. Provide lintels where ever bearing walls are penetrated. Plan the location of all lintels prior to any penetrations being performed.

1.19 ACCESSIBILITY

- A. The Contractor shall locate and install all equipment so that it may be serviced, and maintained as recommended by the manufacturer. Allow ready access and removal of the entire unit and, or parts such as valves, filters, fan belts, motors, prime shafts, etc.

1.20 REQUIRED CERTIFICATIONS

- A. Upon completion of the project, the Contractor shall deliver all inspection certificates acquired during the course of the project to the Owner for their records, inclusive of the boiler certificate (if applicable).
- B. The Contractor shall upon completion of the Final Punch list, deliver to Architect and Engineer a written certification that all systems and work has been completed in compliance with the plans and specifications. The Contractor also shall deliver over to the Owner all required maintenance manuals and phone numbers of the equipment suppliers. The delivery of these documents and certifications will be required prior to final payment and release of retainage.

1.21 INDEMNIFICATION

- A. The Contractor(s) shall hold harmless and indemnify the Engineer, employees, officers, agents and consultants from all claims, loss, damage, actions, causes of actions, expense and/or liability resulting from, brought for, or on account of any personal injury or property damage received or sustained by any person, persons, (including third parties), or any property growing out of, occurring, or attributable to any work performed under or related to this contract, resulting in whole or in part from the negligence of the Contractor, any subcontractor, any employee, agent or representative.

PART 2 - PRODUCTS

2.1 NONE

PART 3 - EXECUTION

3.1 NONE

END OF SECTION 220500

SECTION 220507 - EXCAVATION, TRENCHING, AND BACKFILLING FOR PLUMBING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. Excavation and Backfilling:

1. Do all excavation of all materials encountered including rock required for work under this section. Backfill all trenches, tamping well in 6" layers. System shall be tested, made tight and accepted before backfill. Remove from premises all excess material not used in backfilling. Repair all streets, sidewalks, drives, paving, etc. damaged. Repair materials shall generally match existing construction. All backfilling and repairing shall meet all requirements of the city and others having jurisdiction. Repair work shall be thoroughly first class.
2. Extent of earthwork is to be determined from work indicated on the drawings.
3. Backfilling of trenches is included as part of this work.

1.2 QUALITY ASSURANCE:

- A. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

1.3 JOB CONDITIONS:

- A. Site Information: Complete data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity. It is expressly understood that Owner will not be responsible for interpretations or conclusions drawn from any available data. Classification of Rock: Unclassified.
- B. Should uncharted, or incorrectly charted piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
- C. Provide minimum of one week notice to Architect/Engineer and Owner, and receive written notice to proceed before interrupting any utility.
- D. Use of Explosives:
1. The use of explosives is not permitted.
- E. Protection of Persons and Property: Barricade open excavations occurring as part of

this work and post warning lights.

- F. Operate warning lights as recommended by authorities having jurisdiction. No trenches shall be left open without wood planks capable of supporting 250 pounds (one man) being placed over the open sections.
- G. Protect structures, utilities, retaining walls, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.
- H. Perform excavation within drip-line of large trees to remain by hand, and protect the root system from damage or dryout to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with burlap. Paint root cuts of 1" diameter and larger with emulsified asphalt tree paint.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 SOIL MATERIALS:

- A. Definitions:
 - 1. Suitable soil: Soil deemed suitable by the Architect.
 - 2. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, natural or crushed sand.
 - 3. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100% passing a 1½" sieve and not more than 5% passing a No. 4 sieve.
 - 4. Backfill and Fill Materials: Satisfactory soil materials free of clay, rock or gravel larger than 2" in any dimension, debris waste, frozen materials, vegetable and other deleterious matter.

3.2 EXCAVATION:

- A. Excavation consists of removal and disposal of material encountered when establishing required piping elevations.
- B. Excavation Classifications: The trenching and excavation specified in this section shall be Unclassified. All rock encountered in the installation of piping and conduits shall be removed at no increase in contract price.

- C. Dewatering: Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.
- D. 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. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
- E. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.
- F. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees.
- G. Dispose of excess soil material and waste materials as herein specified.
- H. Excavation for Trenches: Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room.
- I. Excavate trenches to depth indicated or required.
- J. Do not backfill trenches until tests and inspections have been made and backfilling authorized by Architect, Engineer and local authority having jurisdiction. Use care in backfilling to avoid damage or displacement of pipe systems.
- K. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35°F. (1°C).

3.3 COMPACTION:

- A. General: Control soil compaction during construction providing minimum percentage of density specified for each area classification.
- B. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum dry density for soils which exhibit a well-defined moisture density relationship determined in accordance with ASTM D 698; and not less than the following percentages of relative density, determined in accordance with ASTM D 2049, for soil which will not exhibit a well-defined moisture-density relationship.
- C. Compact top 6" of subgrade and each layer of backfill or fill material at 90% maximum dry density.
- D. Moisture Control: When subgrade or layer of soil material must be moisture

conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.

- E. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
- F. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by dicing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.4 BACKFILL AND FILL:

- A. General: Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.
- B. In excavations, use satisfactory excavated or borrow material.
- C. Under piping and conduit, use subbase material where subbase is indicated under piping or conduit; shape to fit bottom 90° of cylinder.
- D. Backfill excavations as promptly as work permits, but not until completion of the following:
- E. Inspection, testing, approval, and recording locations of underground utilities.
- F. Removal of shoring and bracing, and backfilling of voids with satisfactory materials.
- G. Removal of trash and debris.
- H. Placement and Compaction: Place backfill and fill materials in layers not more than 8" in loose depth for material compacted by heavy compaction equipment, and not more than 4" in loose depth for material compacted by hand operated tampers.
- I. Before compaction, moisten each layer as necessary to provide suitable moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

3.5 MAINTENANCE:

- A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- B. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill

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

3.6 DISPOSAL OF EXCESS AND WASTE MATERIALS:

1. Remove excess excavated material, trash, debris and waste materials and dispose of it off Owner's property.

END OF SECTION 220507

SECTION 220519 - METERS AND GAGES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of gauges and thermometers required by this section is indicated on drawings and/or specified in other Division 22 sections.

1.2 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacturer of pressure gauges and thermometers, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

1.3 SUBMITTALS:

- A. Product Data: Submit catalog cuts, specifications, and installation instructions, for each type of measuring device required. Submit showing Manufacturer's figure number, size, and features for each required device.

PART 2 - PRODUCTS

2.1 TEMPERATURE GAGES:

- A. Direct Mount Dial Thermometers:
 - 1. General: Provide direct mount dial thermometers of materials, capacities, and ranges indicated, designed and constructed for use in service indicated.
 - 2. Type: Vapor tension, universal angle.
 - 3. Case: Drawn steel or brass, clear acrylic plastic lens, 4½" diameter.
 - 4. Adjustable Joint: Die cast aluminum, 180° adjustment in vertical plane, 360° adjustment in horizontal plane, with locking device.
 - 5. Thermal Bulb: Copper with phosphor bronze bourbon pressure tube, on scale division accuracy.
 - 6. Movement: Brass precision geared.
 - 7. Scale: Progressive, satin faced, non-reflective aluminum, permanently etched markings.
 - 8. Stem: Copper plated steel, or brass, for separable socket, length to suit

installation.

9. Range: Conform to the following:
 - a. Hot & Cold Water: 40° - 240°F (10°-115°C).
10. Available Manufacturers: Subject to compliance with requirements, manufacturers offering direct mount dial thermometers which may be incorporated in the work include, but are not limited to the following:
 - a. Marsh Instrument Co., Unit of General Signal.
 - b. Terice (H.O.) Co.
 - c. Weiss (Albert A. & Son, Inc.

B. Dial Type Insertion Thermometers:

1. General: Provide dial type insertion thermometers of materials, capacities, and ranges indicated, designed and constructed for use in service indicated.
2. Type: Bi-metal, stainless steel case and stem, 1" diameter dial, dust and leak proof, 1/8" diameter stem with nominal length of 5".
3. Accuracy: 0.5% of dial range.
4. Range: Conform to the following:
 - a. Hot & Cold Water: 0°- 220°F (-10°-110°C).
5. Available Manufacturers: Subject to compliance with requirements, manufacturers offering direct mount dial type insertion thermometers which may be incorporated in the work include, but are not limited to the following:
 - a. Marsh Instrument Co., Unit of General Signal.
 - b. Taylor Instrument Process Control Div., Sybron Corp.
 - c. Terice (H.O.) Co.
 - d. Weiss (Albert A.) & Son, Inc.

C. THERMOMETER WELLS:

1. General: Provide thermometer wells constructed of brass or stainless steel, pressure rated to match piping system design pressure. Provide 2" extension for insulated piping.

2.2 PRESSURE GAGES AND FITTINGS:

- A. General: Provide pressure gages of materials, capacities and ranges indicated, designed

and constructed for use in service indicated.

- B. Type: General use, 1% accuracy, ANSI B 40.1 grade A, phosphor bronze bourdon type, bottom connection.
- C. Case: Drawn steel or brass, clear acrylic plastic lens, 4½" diameter.
- D. Connector: Brass with ¼" male NPT.
- E. Scale: White coated aluminum, with permanently etched markings.
- F. Range: Conform to the following:
 - 1. HVAC Water and steam: 0 - 100 PSI.
- G. Available Manufacturers: Subject to compliance with requirements, manufacturers offering pressure gages which may be incorporated in the work include, but are not limited to the following:
 - 1. Ametek, U.S. Gauge Div.
 - 2. Marsh Instrument Co., Unit of General Signal.
 - 3. Marshalltown, An Eltra Company
 - 4. Terice (H.O.) Co.
 - 5. Weiss (Albert A.) & Son, Inc.
- H. Pressure Gage Cocks:
 - 1. General: Provide pressure gage cocks between pressure gages and gage tees on piping systems. Construct gage cock of brass with ¼" female NPT on each end, and "T" handle brass plug.
- I. Snubber: ¼" brass bushing with corrosion resistant porous metal disc, through which pressure fluid is filtered. Select disc material for fluid served and pressure rating.
- J. Pressure Gage Connector Plugs:
 - 1. General: Provide pressure gage connector plugs pressure rated for 150 PSI and 200°F. Construct of brass and finish in nickel-plate, equip with ½" NPT fitting, with self-sealing valve core type neoprene gasketed orifice suitable for inserting 1/8" O.D. probe assembly from dial type insertion pressure gage. Equip orifice with gasketed screw cap and chain. Provide extension, length equal to insulation thickness, for insulated piping.

PART 3 - EXECUTION

3.1 INSTALLATION OF TEMPERATURE GAGES:

- A. General: Install temperature gages in vertical upright position, and tilted so as to be easily read by observer standing on floor.
- B. Locations: Install at the following locations, and elsewhere as indicated:
 - 1. At the hot water supply line from the domestic water heater.
 - 2. At the hot water return line from the recirculating pump.
- C. Thermometer Wells: Install in piping tee where indicated, in vertical upright position. Fill well with oil or graphite, secure cap.

3.2 INSTALLATION OF PRESSURE GAGES:

- A. General: Install pressure gages in piping tee with pressure gage cock, located on pipe at most readable position.
- B. Locations: Install in the following locations, and elsewhere as indicated:
 - 1. At water service entrance
 - 2. At inlet and discharge of each pressure reducing valve.
 - 3. At inlet and discharge of each circulating pump

END OF SECTION 220519

SECTION 220523 - GENERAL DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1. DESCRIPTION OF WORK:

1.1 Extent of valves required by this section is indicated on drawings and/or specified in other Division 22 sections.

A. Types of valves specified in this section include the following:

1. Gate Valves.
2. Globe Valves.
3. Drain Valves.
4. Ball Valves.
5. Swing and Lift Check Valves.

1.2 QUALITY ASSURANCE:

A. Manufacturers: Firms regularly engaged in manufacture of valves, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

1.3 SUBMITTALS:

A. Product Data: Submit catalog cuts, specifications, installation instructions, and dimensioned drawings for each type of valve. Include pressure drop curve or chart for each type and size of valve. Submit valve schedule showing Manufacturer's figure number, size, location, and valve features for each required valve.

PART 2 - PRODUCTS

2.1 VALVES:

A. General: Provide factory-fabricated valves recommended by manufacturer for use in service indicated. Provide valves of types and pressure ratings indicated; provide proper selection as determined by Installer to comply with installation requirements. Provide sizes as indicated, and connections which properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Installer's option.

2.2 GATE VALVES:

A. Packing: Select valves designed for repacking under pressure when fully opened,

equipped with packing suitable for intended service. Select valves designed so back seating protects packing and stem threads from fluid when valve is fully opened, and equipped with gland follower.

1. For Low Pressure Domestic Water Service:
 - a. Threaded Ends 2" and Smaller: Class 125, bronze body, union bonnet, rising stem, solid wedge.
 - b. Flanged Ends 2½" and Larger: Class 125, iron body bronze mounted, bolted bonnet, rising stem, OS&Y, solid wedge.
 - c. Soldered Ends 2" and Smaller: Class 125, bronze body, screwed bonnet, non-rising stem, solid wedge.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering gate valves which may be incorporated in the work include, but are not limited to the following:
 - a. Crane Co., Valve Div.
 - b. Fairbanks Co.
 - c. Hammond Valve Corp., Div. of Conval Corp.
 - d. Jenkins Bros., A Corp.
 - e. NIBCO, Inc.
 - f. Powell (Wm.) Co.
 - g. Stockham Valves and Fittings, Inc.
 - h. Walworth Co.

2.3 GLOBE VALVES:

- A. Packing: Select valves designed for repacking under pressure when fully opened, equipped with packing suitable for intended service. Select valves designed so back seating protects packing and stem threads from fluid when valve is fully opened, and equipped with gland follower.
- B. Composition Discs: Where required, provide suitable material for intended service. For stem throttling service, fit composition disc valve with throttling nut.
- C. Comply with the following standards:
 1. Bronze Valves: MSS SP-80.
- D. For Domestic Water Service:

1. Flanged, Threaded or Solder Ends 2½" and Larger: Class 150, bronze body, union bonnet, plug-type, OS&Y, renewable seat and disc, rated for severe throttling.

E. Available Manufacturers: Subject to compliance with requirements, manufacturers offering globe valves which may be incorporated in the work include, but are not limited to, the following:

1. Crane Co., Valve Div.
2. Fairbanks Co.
3. Hammond Valve Corp., Div. of Conval Corp.
4. Jenkins Bros., A Corp.
5. NIBCO, Inc.
6. Powell (Wm.) Co.
7. Stockham Valves and Fittings, Inc.
8. Walworth Co.

2.4 SWING CHECK VALVES:

A. General: Construct pressure containing parts of valves as follows:

1. Bronze Valves, 125 or 150 PSI: ANSI/ASTM B 62.

B. Construct valves of pressure castings free of any impregnating materials.

C. Construct valves of bronze, regrinding, with seating angle 40° to 45°, unless composition disc is specified.

D. Provide stop plug as renewable stop for disc hanger, unless otherwise specified.

E. Construct disc and hanger as separate parts, with disc free to rotate.

F. Support hanger pins on both ends by removable side plugs.

2.5 Available Manufacturers: Subject to compliance with requirements, manufacturers offering swing check valves which may be incorporated in the work include, but are not limited to the following:

1. Crane Co., Valve Div.
2. Fairbanks Co. (The)
3. Hammond Valve Corp., A Condec Co.
4. Jenkins Bros., A Corp.
5. NIBCO, Inc.

6. Powell Co. (The Wm.)
7. Stockham Valves and Fittings, Inc.
8. Walworth Co.

2.6 LIFT CHECK VALVES:

- A. General: Provide lift check valves, 2" and smaller, constructed of bronze or forged steel to suit service. Construct bronze valves with basic rating of 125 or 150 PSI with pressure containing parts of materials having at least physical properties of ANSI/ASTM B 62. Conform to ANSI /FCI 74-1 for design, rating, and testing. Construct pressure castings, free of any impregnating materials.
- B. Horizontal Lift Check Valves: ¼" to 2", straight pattern threaded or soldered ends, pressure rated for 150 PSI, renewable composition disc, screw-over cap, bronze body.
- C. Spring Loaded Horizontal Lift Check Valves: ¼" to 2", straight pattern, threaded or soldered ends, pressure rated for 150 PSI, renewable composition disc, phosphor bronze wire spring, screw over cap, bronze body.
- D. Available Manufacturers: Subject to compliance with requirements, manufacturers offering lift check valves which may be incorporated in the work include, but are not limited to the following:
 1. Fairbanks Co. (The).
 2. Hammond Valve Corp., A Condec Co.
 3. Jenkins Bros., A Corp.
 4. Lunkenheimer Co. (The), Div. Conval Corp.
 5. Powell Co. (The Wm.).
 6. Stockham Valves & Fittings, Inc.

2.7 BALL VALVES:

- A. General: Select with port area equal to or greater than connecting pipe area, include seat ring designed to hold sealing material.
- B. For Domestic Water Service:
 1. Threaded Ends 2" and Smaller: Class 125, bronze 2 piece body, bronze ball, bronze stem.
 2. Soldered Ends 2" and Smaller: Class 125, bronze, 2 piece body, bronze ball, bronze stem.

- C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering ball valves which may be incorporated in the work include, but are not limited to the following:

1. Conbraco Industries, Inc.
2. Crane Co., Valve Div.
3. Fairbanks Co.
4. Hammond Valve Corp., Div. of Conval Corp.
5. Jamesbury Corp.
6. NIBCO, Inc.
7. Stockham Valves and Fittings, Inc.
8. Walworth Co.

2.8 DRAIN VALVES:

- A. For Low Pressure Drainage Service:

1. Threaded Ends 2" and Smaller: Class 125, bronze body, screwed bonnet, rising stem, composition disc, 3/4" hose outlet connection.
2. Soldered Ends 2" and Smaller: Class 125, bronze body, screwed bonnet, rising stem, composition disc, 3/4" hose outlet connection.

- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering drain valves which may be incorporated in the work include, but are not limited to, the following:

1. Crane Co., Valve Div.
2. Fairbanks Co.
3. Hammond Valve Corp., Div. of Conval Corp.
4. Jenkins Bros., A Corp.
5. NIBCO, Inc.
6. Walworth, Co.

2.9 SWING CHECK VALVES:

- A. General: Construct pressure containing parts of valves as follows:

1. Bronze Valves, 125 or 150 PSI: ANSI/ASTM B 62.
2. Metallic Seated Bronze Valves, 200 or 300 PSI: ANSI/ASTM B 61.
3. Iron Body Valves: ANSI/ASTM A 126, Grade B.

- B. Comply with MSS SP-71 for design, workmanship, material and testing.
- C. Construct valves of pressure castings free of any impregnating materials. Construct valves of bronze, regrinding, with seating angle 40° to 45°, unless composition disc is specified.
- D. Provide stop plug as renewable stop for disc hanger, unless otherwise specified.
- E. Construct disc and hanger as separate parts, with disc free to rotate.
- F. Support hanger pins on both ends by removable side plugs.
- G. For Domestic Water Service:
 - 1. Threaded Ends 2" and Smaller: Class 125, bronze body, screwed cap, horizontal swing, bronze disc.
 - 2. Soldered Ends 2" and Smaller: Class 125, bronze body, screwed cap, horizontal swing, bronze disc.
 - 3. Flanged Ends 2½" and Larger: Class 125, iron body bronze mounted, bolted cap, horizontal swing, cast iron disc.
- H. Available Manufacturers: Subject to compliance with requirements, manufacturers offering swing check valves which may be incorporated in the work include, but are not limited to the following:
 - 1. Crane Co., Valve Div.
 - 2. Fairbanks Co. (The)
 - 3. Hammond Valve Corp., A Condec Co.
 - 4. Jenkins Bros., A Corp.
 - 5. NIBCO, Inc.
 - 6. Powell Co. (The Wm.)
 - 7. Stockham Valves and Fittings, Inc.
 - 8. Walworth Co.

2.10 VALVE FEATURES:

- A. General: Provide valves with features indicated and, where not otherwise indicated, provide proper valve features as determined by Installer for installation requirements. Comply with ANSI B31.1

- B. Outside Screw and Yoke: Stem and handwheel designed to rise out of bonnet or yoke as valve is operated from closed to open position.
- C. Inside Screw, Non-Rising Stem: Stem and handwheel designed to rotate without rising when valve is operated from closed to open position.
- D. Threaded: Valve ends complying with ANSI B2.1.
- E. Bonnet: Part of gate or globe valve through which stem passes to valve body, and attached to valve body by screws, bolts, union or welding.
- F. Solid Wedge: One piece tapered disc in gate valve, designed for contact on both sides.
- G. Outside Screw and Yoke: Stem and handwheel designed to rise out of bonnet or yoke as valve is operated from closed to open position.
- H. Inside Screw, Non-Rising Stem: Stem and handwheel designed to rotate without rising when valve is operated from closed to open position.
- I. Valve System: Select and install valves with outside screw and yoke stems, except provide inside screw non-rising stem valves where headroom prevents full opening of OS&Y valves.
- J. Renewable Seats: Select and install valves with renewable seats, except where otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. General: Except as otherwise indicated, comply with the following requirements:
- B. Install valves where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary.
- C. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward for horizontal plane unless unavoidable. Install valve drains with hose end adapter for each valve that must be installed with stem below horizontal plane.
- D. Insulation: Where insulation is indicated, install extended stem valves, arranged in proper manner to receive insulation.

- E. Applications Subject to Shock: Install valves with bodies of metal other than cast iron where thermal or mechanical shock is indicated or can be expected to occur.
- F. Valve System: Select and install valves with outside screw and yoke stems, except provide inside screw non-rising stem valves where headroom prevents full opening of OS&Y valves.
- G. Fluid Control: Where throttling is indicated or recognized as principal reason for valve, install globe valves.
- H. Installation of Check Valves:
 - 1. Swing Check Valves: Install in horizontal position with hinge pin horizontally perpendicular to center line of pipe. Install for proper direction of flow.

END OF SECTION 220523

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of supports, anchors and seals required by this section is indicated on drawings and/or specified in other Division 22 sections.
- B. Types of supports, anchors, and seals specified in this section include the following:
 - 1. Horizontal-Piping Hangers and Supports.
 - 2. Vertical-Piping Clamps.
 - 3. Hanger-Rod Attachments.
 - 4. Building Attachments.
 - 5. Saddles and Shields.
 - 6. Miscellaneous Materials.
 - 7. Anchors.
- C. Supports, anchors, and seals furnished as part of factory-fabricated equipment, are specified as part of the equipment assembly in other Division 22 sections. Also refer to Drawings for notes regarding the post tension slab system.

1.2 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacturer of supports, anchors, and seals, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Select and apply pipe hangers and supports, complying with MSS SP-69. Size hangers and supports to support pipe weight and fluid conveyed.

PART 2 - PRODUCTS

2.1 HORIZONTAL-PIPING HANGERS AND SUPPORTS:

- A. General: Except as otherwise indicated, provide factory fabricated horizontal-piping hangers and supports complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly

fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping.

1. Adjustable Steel Clevises: MSS Type 1.
2. Alloy Steel Pipe Clamps: MSS Type 2.
3. Steel Double Bolt Pipe Clamps: MSS Type 3.
4. Steel Pipe Clamps: MSS Type 4.
5. Pipe Hangers: MSS Type 5.
6. Adjustable Swivel Pipe Rings: MSS Type 6.
7. Adjustable Steel Band Hangers: MSS Type 7.
8. Adjustable Band Hangers: MSS Type 9.
9. Extension Split Pipe Clamps: MSS Type 12.
10. Single Pipe Rolls: MSS Type 41.
11. Pipe Roll Stands: MSS Type 44.
12. Adjustable Roller Hangers: MSS Type 43.
13. Pipe Rolls and Plates: MSS Type 45.

2.2 VERTICAL-PIPING CLAMPS:

- A. General: Except as otherwise indicated, provide factory fabricated vertical-piping clamps complying with ANSI/MSS SP-58, of one of the following types listed, selected by Installer to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe.

1. Two-Bolt Riser Clamps: MSS Type 8.
2. Four-Bolt Riser Clamps: MSS Type 42.

2.3 HANGER-ROD ATTACHMENTS:

- A. General: Except as otherwise indicated, provide factory fabricated hanger-rod attachments complying with ANSI/MSS SP-58. Select size of hanger-rod attachments to suit hanger rods.

1. Steel Clevises: MSS Type 14.
2. Swivel Turnbuckles: MSS Type 15.
3. Steel Weldless Eye Nuts: MSS Type 17.

2.4 BUILDING ATTACHMENTS:

1. General: Except as otherwise indicated, provide factory fabricated building attachments complying with ANSI/MSS SP-58

2.5 SADDLES AND SHIELDS:

1. General: Except as otherwise indicated, provide saddles or shields for piping hangers and supports, factory-fabricated, for all insulated piping. Size saddles and shields for exact fit to mate with pipe insulation.
- B. Protection Saddles: MSS Type 39; fill interior voids with segments of insulation matching adjoining insulation.
- C. Protection Shields: MSS Type 40; of length recommended by manufacturer to prevent crushing of insulation.

2.6 MANUFACTURERS OF HANGERS AND SUPPORTS:

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering hangers and supports which may be incorporated in the work include, but are not limited to the following:
 1. Anvil
 2. C & S Mfg. Corp.
 3. Carpenter and Patterson, Inc.
 4. Elcen Metal Products Co.
 5. F & S Central Mfg. Corp.
 6. Fee & Mason Mfg. Co., Div. of A-T-O, Inc.
 7. ITT Grinnel Corp.

PART 3 - EXECUTION

3.1 INSTALLATION OF HANGERS AND SUPPORTS:

- A. General: Install hangers, supports, clamps and attachments to support piping properly from building structure; comply with MSS SP-69. Install supports with maximum of eight foot spacing. Building attachments and/or hangars systems shall be cast in place into the concrete post tension slab system during concrete placement. Refer to Drawings for additional notes. Do not use wire or perforated metal to support piping, and do not support piping from other piping, ductwork or other supported mechanical or electrical items.
- B. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and style as installed for adjacent similar piping.
- C. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated, or by other recognized industry methods.

- D. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes.
- E. Insulated Piping: Comply with the following installation requirements.
- F. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.
- G. Saddles: Where insulation without vapor barrier is indicated, install protection saddles.

END OF SECTION 220529

SECTION 220533 - IDENTIFICATION FOR DOMESTIC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of mechanical identification work required by this sections indicated on drawings and/or specified in other Division 23 sections. Systems which must be identified are as follows:
 - 1. Water Heaters
 - 2. Domestic Hot Water Systems
 - 3. Natural Gas Piping
- B. Type of identification devices specified in this section include the following:
 - 1. Engraved Plastic-Laminate Signs
 - 2. Pipe Identification

1.2 SUBMITTALS

- A. Product Data: Submit product specifications and installation instructions for each identification material and device required.

PART 2 - PRODUCTS

2.1 IDENTIFICATION MATERIALS:

- A. PIPE STENCILING
 - 1. Provide stenciled markers and arrows indicating direction of flow on all piping installed under this Contract after the piping has been painted. Markers and arrows shall be painted on the piping using machine cut stencils. All letters shall be sprayed using fast drying lacquer paint. All markers and arrows shall be properly oriented so that descriptive name may be easily read from the floor.
- B. VALVE TAGS:
 - 1. Provide the following:
 - a. Brass Valve Tags: Provide 19 gauge polished brass valve tags with

stamp engraved piping system abbreviation in ¼" high letters and sequenced valve numbers ½" high, and with 5/32" hole for fastener. Provide 1½" diameter tags, except as otherwise indicated.

- b. Valve Tag Fasteners: Manufacturer's standard solid brass chain (wire link or headed type), or solid brass S-hooks of the sizes required for proper attachment of tags to valves, and manufactured specifically for that purpose.

C. ENGRAVED PLASTIC-LAMINATE SIGNS:

- 1. General: Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in the sizes and thicknesses indicated, engraved with engraver's standard letter style of the sizes and wording indicated, black with white core (letter color) except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate. Thickness: 1/16" for units up to 20 sq. in. or 8" length; 1/8" for larger units. Fasteners: Self-tapping stainless steel screws, expect contact-type permanent adhesive where screws cannot or should not penetrate the substrate.

2.2 LETTERING AND GRAPHICS:

- A. General: Coordinate names, abbreviations and other designations used in mechanical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturer's or as required for proper identification and operation/maintenance of mechanical systems and equipment. Lettering in no case shall be less than 1/2" in height.

PART 3 - EXECUTION

3.1 APPLICATION AND INSTALLATION:

A. PIPING & VALVING:

- 1. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.
- 2. Locate pipe markers as follows wherever piping is exposed to view in occupied

spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums), exterior exposed locations and above removable acoustical ceilings.

- a. Near each valve and control device.
 - b. Near locations where pipes pass through walls or floors/ceilings, or enter non-accessible enclosures.
 - c. Near major equipment items and other points of origination and termination.
 - d. Spaced intermediately at maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment.
3. Valve Identification General: Provide valve tag on every valve, cock and control device in each piping system listed under the paragraph entitled "DESCRIPTION OF WORK"; exclude check valves, valves within factory-fabricated equipment units, and shut-off or isolation valves at equipment. List each tagged valve in valve schedule for each piping system.
 4. Mount valve schedule frames and schedules in machine rooms where indicated or, if not otherwise indicated, where directed by the Architect/Engineer.
 5. Do not use plastic piping markers where located in a return air plenum.

3.2 PIPE PAINTING AND IDENTIFICATION

A. Piping shall be required to be painted and identified as follows:

1. Domestic Hot Water: Black Letters on a Yellow Background: "DOM. HOT"
2. Natural Gas Piping: Yellow Letters on a Green Background: "N.GAS"

3.3 PLUMBING EQUIPMENT:

A. Mechanical Equipment Identification, General: Install engraved plastic laminate sign on or near each major item of mechanical equipment and each operational device, as specified herein.

1. Water Heaters

END OF 220533

SECTION 220700 - PLUMBING INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of mechanical insulation required by this section is indicated on drawings, and by requirements of this section.
- B. Types of mechanical insulation specified in this section include the following:
 - 1. Piping System Insulation:
 - a. Domestic Cold Water Lines
 - b. Hot Water & Circulating Hot Water Lines
 - c. Cooling Coil Condensate Piping
 - d. Lavatory P-Trap and Supplies

1.2 QUALITY ASSURANCE:

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to the following:
 - 1. Armaflex
 - 2. Armstrong World Industries, Inc.
 - 3. Babcock & Wilcox Co., Insulating Products Div.
 - 4. Certainteed Corp.
 - 5. Johns-Manville Corp.
 - 6. Keene Corp.
 - 7. Knauf Fiber Glass
 - 8. Owens-Corning Fiberglass Corp.
- B. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread rating of 25 or less, and smoke-developed rating of 50 or less, as tested by ANSI/ASTM E 84 (NFPA 255) method.

1.3 INSULATION SHIELDS

- A. Metal insulation shields are required at all pipe hangers where the piping is insulated. Metal shields shall be constructed of galvanized steel, formed to a 180 degree arc with lengths equal to at least twice the pipe diameter.

1.4 SUBMITTALS:

- A. Product Data: Submit manufacturer's specifications and installation instructions for each type of mechanical insulation. Submit schedule showing manufacturer's product number, thickness, and furnished accessories for each mechanical system requiring insulation.
- B. Certified Tests: With product data submit certified test reports on performances including burning characteristics and thermal insulating values.

1.5 DELIVERY, STORAGE AND HANDLING:

- A. Deliver insulation, coverings, cements, adhesives, and coatings to site in containers with manufacturer's stamp or label, affixed showing fire hazard ratings of products.
- B. Protect insulation against dirt, water, and chemical and mechanical damage. Do not install damaged insulation; remove damaged insulation from project site.

PART 2 - PRODUCTS

PIPING INSULATION: Piping Insulation:

All hot water, condensate waste and domestic water piping shall be insulated. The insulation shall be a heavy density, pipe insulation with a K factor .22 at 75°F mean temperature. The insulation shall be wrapped with a vapor barrier jacket with self-sealing lap, equal to Certain-teed, Mansville, Owens-Corning. Cover fittings with Zeston or equal premolded insulating fittings. Insulation shall be installed in a professional, neat appearing manner; poor workmanship shall be corrected at the Contractor's expense.

Application thicknesses shall be as follows:

Domestic hot and recirc. hot water piping Under 1.5" Size:	1" thick
Domestic hot and recirc. hot water piping 1.5" Size & Larger:	1.5" thick
Domestic cold water piping:	1/2" thick
Cooling Coil Condensate piping:	1/2" thick

Lavatory P-traps and supplies shall be insulated with 1/2" premolded fiberglass "Trap-wrap" with integral plastic white jacket.

Insulation may be omitted on concealed water lines in chase walls where feeding water fixtures

Underground domestic water stub-ups through the floor slab shall be insulated with 1" Imcolock from 30" below the slab up through the slab floor. Do not pour slab up to pipe risers through floor slabs, or remedial work will be required to correct at Contractor's cost.

INSTALLATION OF INSULATION:

General: Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.

Install insulation materials with smooth and even surface. Insulate each continuous run of piping or ductwork with full-length units of insulation, with single cut piece to complete run. Do not use cut pieces or scraps abutting each other.

Clean and dry all surfaces prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.

Cover valves, fittings and similar items in each piping system with equivalent thickness and composition of insulation as applied to adjoining pipe run. Install factory molded, precut or job fabricated units (at Installer's option) except where specific form or type is indicated.

Maintain integrity of vapor-barrier jackets on pipe and ductwork insulation, and protect to prevent puncture or other damage.

Extend piping insulating without interruption through walls, floors and similar piping penetrations, except where otherwise indicated.

Install protective metal shields and insulated inserts wherever needed to prevent compression of insulation. Pipe Hanger Insulation Inserts: Butt pipe insulation against pipe hanger insulation inserts. For cold piping apply wet coat of vapor barrier lap cement on butt joints and seal joints with 3 inch wide vapor barrier tape or band.

PART 3 - EXECUTION

3.1 INSTALLATION OF INSULATION:

A. General: Install insulation products in accordance with manufacturer's written

instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.

- B. Install insulation materials with smooth and even surface. Insulate each continuous run of piping or ductwork with full-length units of insulation, with single cut piece to complete run. Do not use cut pieces or scraps abutting each other.
- C. Clean and dry all surfaces prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.
- D. Cover valves, fittings and similar items in each piping system with equivalent thickness and composition of insulation as applied to adjoining pipe run. Install factory molded, precut or job fabricated units (at Installer's option) except where specific form or type is indicated.
- E. Maintain integrity of vapor-barrier jackets on pipe and ductwork insulation, and protect to prevent puncture or other damage.
- F. Extend piping insulating without interruption through walls, floors and similar piping penetrations, except where otherwise indicated.
- G. Install protective metal shields and insulated inserts wherever needed to prevent compression of insulation. Pipe Hanger Insulation Inserts: Butt pipe insulation against pipe hanger insulation inserts. For cold piping apply wet coat of vapor barrier lap cement on butt joints and seal joints with 3 inch wide vapor barrier tape or band.

3.2 PROTECTION AND REPLACEMENT:

- A. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.
- B. Protection: Insulation Installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

END OF SECTION 220700

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of domestic water piping required by this section is indicated on drawings and/or specified in other Division 22 sections or as required to provide a complete system.

1.2 QUALITY ASSURANCE:

- A. Plumbing Code Compliance: Comply with Kentucky State Plumbing Code and pertaining to plumbing materials, construction and installation of products. Also comply with all state and local codes having jurisdiction. No work shall begin until the Contractor has approved plumbing plans. The Contractor is responsible for installing the indicated systems in accordance with code, therefore any modifications to the project required by the Division of Plumbing shall be considered as part of this project and shall be made at no increase in contract price.

1.3 DELIVERY STORAGE, AND HANDLING:

- A. Where possible, store pipe and tube inside and protected from weather. Where necessary to store outside, elevate above grade and enclose with durable, waterproof wrapping. Maintain end-caps through shipping, storage and handling as required to prevent pipe-end damage and eliminate dirt and moisture from inside of pipe and tube.
- B. Protect flange and fittings from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

1.4 SUBMITTALS:

- A. Product Data: Submit catalog cuts, specifications, installation instructions, and dimensioned drawings for each type of valve, specialty, etc. Include pressure drop curve or chart for each type and size of equipment.

PART 2 - PRODUCTS

2.1 PLUMBING PIPING MATERIALS:

- A. All piping for hot and cold water above the slab, within the building, shall be type "L" hard temper copper tube with wrought copper fittings and soldered connections made up with lead free solder equal in performance to 95/5 solder.
- B. All underslab piping for cold water within the building, shall be type "K" hard temper

copper tube with wrought copper fittings and soldered connections made up with lead free solder equal in performance to 95/5 solder. Bury with sand backfill to protect piping from aggregate.

- C. Provide water hammer arrestors at the main plumbing group wet wall cold water piping.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION;

- A. Pipe shall be accurately cut from job measurements and shall be neatly aligned, securely connected, and properly supported. Piping shall be thoroughly cleaned before installation. Provide pipe sleeves where piping passes through structure. Threaded and soldered joints shall be made in a workmanlike manner according to good pipe fitting practices.
- B. Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details and notations or, if not otherwise indicated, run piping in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold piping close to walls, overhead construction, columns and other structural and permanent-enclosure elements of building; limit clearance to 1/2" where furring is shown for enclosure or concealment of piping, but allow for insulation thickness, if any. Where possible, locate insulated piping for 1.0" clearance outside insulation. Wherever possible in finished and occupied spaces, conceal piping from view, by locating in column enclosures, in hollow wall construction or above suspended ceilings; do not encase horizontal runs in solid partitions, except as indicated.
- C. Electrical Equipment Spaces: Do not run piping through transformer vaults, over panels and other electrical or electronic equipment spaces and enclosures.
- D. Braze copper tube-and-fitting joints where indicated, in accordance with ANSI B31.
- E. Solder copper tube-and-fitting joints where indicated, in accordance with recognized industry practice. Cut tube ends squarely, ream to full inside diameter, and clean outside of tube ends and inside of fittings. Apply solder flux to joint areas of both tubes and fittings. Insert tube full depth into fitting, and solder in manner which will draw solder full depth and circumference of joint. Wipe excess solder from joint before it hardens.
- F. Install valves where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary. Install shut-off valves for each piece of plumbing equipment.

- G. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward for horizontal plane unless unavoidable. Install valve drains with hose end adapter for each valve that must be installed with stem below horizontal plane.
- H. Ferrous pipe hangers shall be Fee & Mason Figure 215 or equal Unistrut malleable iron split ring hanger; copper pipe hangers shall be Figure 361 cast brass with plated adjuster. No perforated strap iron hangers will be permitted. Fee & Mason #400 "Auto-Grip" type hangers are an acceptable alternative hanger. Concrete inserts, where required, shall be Unistrut, Midwest, or Truscon. Hangers shall be spaced at ten foot intervals or less, as required to avoid sag, prevent vibration, and allow accurate leveling or grading. Vertical piping shall be supported by Fee & Mason Figure 241 or equal clamp for ferrous piping, and Figure 368 for copper. Provide sheet metal saddles for insulated piping.
- I. Do not use wire or perforated metal to support piping, and do not support piping from other piping, ductwork or other supported mechanical or electrical items. Install hangers and supports to provide indicated pipe slopes.

3.2 AIR CHAMBERS AND TRAPS:

- A. Wherever water piping terminates at a fixture or valve, furnish and install air chambers of sufficient capacity to prevent water hammer. Length shall be at least 12 times branch pipe diameter. Every fixture shall be separately trapped with a water sealed trap installed as close to the fixture as possible.

3.3 PIPING STERILIZATION:

- A. Sterilize the new hot and cold water piping system with solution containing not less than 50 PPM available chlorine. Solution shall remain in the system a minimum of 24 hours, with each valve being operated several times during the period. After completion, flush system with city water until chlorine residual is lowered to incoming city water level.

3.4 TESTING:

- A. All water piping shall be tested with 50 PSI hydrostatic pressure; isolate piping from boiler prior to testing. All piping shall be tested before any insulation installed, and shall be subject to the above pressure for an uninterrupted period of not less than 4 hours. All lines, joints, flanges, valve stems, etc., shall be leak tight.
- B. General: Provide temporary equipment for testing, including pump and gages. Test piping system before insulation is installed. Remove control devices before testing.
- C. Observe each test section for leakage at end of test period. Test fails if leakage is observed or if pressure drop exceeds 5% of test pressure.

- D. Repair piping systems sections which fail required piping test, by disassembly and re-installation, using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.

END OF SECTION 221116

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of piping specialties required by this section is indicated on drawings and/or specified in other Division 22 sections or as required to provide a complete system.
- B. Types of piping specialties specified in this section include the following:
 - 1. Wall Hydrants
 - 2. Backflow Preventer
 - 3. Pressure Reducing Valve
 - 4. Pipe Escutcheons
 - 5. Pipeline Strainers.
 - 6. Dielectric Unions.
 - 7. Sleeves.
 - 8. Sleeve Seals.

1.2 QUALITY ASSURANCE:

- A. Plumbing Code Compliance: Comply with Kentucky State Plumbing Code and pertaining to plumbing materials, construction and installation of products. Also comply with all state and local codes having jurisdiction. No work shall begin until the Contractor has approved plumbing plans. The Contractor is responsible for installing the indicated systems in accordance with code, therefore any modifications to the project required by the Division of Plumbing shall be considered as part of this project and shall be made at no increase in contract price.
- B. Manufacturers: Firms regularly engaged in manufacturer of piping specialties of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

1.3 SUBMITTALS:

- A. Product Data: Submit catalog cuts, specifications, installation instructions, Also submit dimensioned drawings for pipeline strainers. Include pressure drop curve or chart for each type and size of pipeline strainer. Submit schedule showing manufacturer's figure number, size, location and features for each required pipeline strainer.
- B. Maintenance Data: Submit maintenance data and spare parts lists for each type of

pipeline strainer. Include this data in Maintenance Manual.

PART 2 - PRODUCTS

2.1 MANUFACTURED PIPING SPECIALTIES:

- A. General: Provide factory-fabricated piping specialties recommended by manufacturer for use in service indicated. Provide piping specialties of types, pressure ratings, voltage and wattage indicated for each service, or if not indicated, provide proper selections as determined by Engineer to comply with installation requirements. Provide sizes as indicated, and connections, which properly interface with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Installer's option.
- B. Hose Valves: American-Standard #4224.028 with screw-on vacuum breaker and 3/4" hose thread outlet.
- C. Wall Hydrants: Wall hydrants shall be Jay R. Smith #5609-PB "non-freeze", cast bronze, polished bronze face, with integral vacuum breaker, 3/4" hose connection, removable key handle operator; or equal Josam, Wade, or Zurn. Provide accessible stop valve inside building.
- D. Pressure Reducing Valve: PRV shall be Fisher Regulator 75A or approved equal Watts, Wilkins, bronze body with trim, direct acting, spring loaded diaphragm type, suitable for 200 psi inlet pressure. Outlet pressure to be set as indicated on drawings, adjustable.
- E. Backflow Preventer: This contractor shall furnish and install a double check valve backflow preventer where indicated for the water service entrance, and where else indicated on the Drawings. Double check valve assembly to be equal to Watts #LF709 or approved equal Wilkins, double check valve type, bronze body, trim, and bronze ball valve shut-offs on inlet and outlet. Lead Free.
- F. Pipe Escutcheons, General: Provide pipe escutcheons as specified herein with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings, and pipe sleeve extension, if any. Furnish pipe escutcheons with nickel or chrome finish for occupied areas, prime paint finish for unoccupied areas.
 - 1. Pipe Escutcheons for Moist and Wet Areas: For waterproof floors, and areas where water and condensation can be expected to accumulate provide cast brass or sheet brass escutcheons, solid or split hinged.

2. Pipe Escutcheons for Dry Areas: Provide sheet steel escutcheons, solid or split hinged.
- G. Low Pressure Y-Type Pipeline Strainers, General: Comply with FCI 73-1. Provide strainers full line size of connecting piping, with ends matching piping system materials. Select strainers for 125 psi working pressure with Type 304 stainless steel screens, with 3/64" performance at 233 per sq. in.
1. Threaded Ends, 2" and Smaller: Cast-iron body, screwed screen retainer with centered blowdown fitted with pipe plug.
 2. Threaded Ends, 2½" and Larger: Cast-iron body, bolted screen retainer with off-center blowdown fitted with pipe plug.
 3. Flanged Ends, 2½" and Larger: Cast-iron body, bolted screen retainer with off-center blowdown fitted with pipe plug.
 4. Available Manufacturers: Subject to compliance with requirements, manufacturers offering low pressure Y-type strainers which may be incorporated in the work include, but are not limited to the following:
 - a. American Air Filter, an Allis-Chalmers Co.
 - b. Armstrong Machine Works.
 - c. Hoffman Specialty, ITT Fluid Handling Div.
 - d. Metraflex Co.
 - e. Sarco Co., Div. of White Consolidated.
 - f. Crane Co.
 - g. Trelice (H.O.) Co.
 - h. Victaulic Co. of America
- H. Dielectric Unions, General: Provide standard products recommended by manufacturer for use in service indicated, which effectively isolate ferrous from non-ferrous piping (electrical conductance), prevent galvanic action, and stop corrosion. Universal Controls or equal
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering dielectric unions which may be incorporated in the work include, but are not limited to the following:
 - a. Atlas Products Co.
 - b. Capital Mfg. Co., Div. of Harsco Corp.
 - c. Eclipse, Inc.
 - d. Epco Sales, Inc.

- e. FMC Corp.
- f. McNally, Inc.
- g. PSI Industries.
- h. Stockham Valves and Fittings.
- i. Universal Controls

2.2 FABRICATED PIPING SPECIALTIES:

A. Pipe Sleeves: Provide pipe sleeves of one of the following:

- 1. Sheet-Metal: Fabricate from galvanized sheet metal; round tube closed with snaplock joint, welded spiral seams or welded longitudinal joint. Fabricate from the following gages: 3" and smaller, 20 gage; 4" to 6", 16 gage; over 6", 14 gage.
 - a. Steel-Pipe: Fabricate from Schedule 40 galvanized steel pipe; remove burrs.
 - b. Iron-Pipe: Fabricate from cast-iron or ductile-iron pipe, remove burrs.

B. Sleeve Seals: Provide sleeve seals for sleeves located in foundation walls below grade, or in exterior walls, of one of the following:

- 1. Mechanical Sleeve Seals: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering mechanical sleeve seals which may be incorporated in the work include, but are not limited to the following:

- 1. Thunderline Corp.

PART 3 - EXECUTION

3.1 INSTALLATION OF MANUFACTURED PIPING SPECIALTIES:

- A. Pipe Escutcheons: Install pipe escutcheons on each pipe penetration thru floors, walls, partitions, and ceilings where penetration is exposed to view; and on exterior of building. Secure escutcheon to pipe or insulation so escutcheon covers penetration hole and is flush with adjoining surface

- B. Wall Hydrants: Install as indicated on the Drawings in accordance with manufacturer's recommendations.
- C. Pressure Reducing Valve: This contractor shall furnish and install a pressure reducing valve (PRV) on the domestic water service entrance as indicated. Coordinate with Engineer the setting of the valve if not clearly indicated on Drawings.
- D. Backflow preventer: Provide new service backflow preventer, and provide new backflow preventer at the hydronic system fill stations for the cooling tower and the boiler. Comply with all manufacturer's installation instructions.
- E. Dielectric Unions: Install at each piping joint between ferrous and non-ferrous piping. Comply with manufacturer's installation instructions.
- F. Y-Type Strainers: Install Y-type strainers, full size of pipe line, in accordance with manufacturer's installation instructions. Install pipe nipple and shutoff valve in strainer blow down connection, full size of connection. Where indicated, provide drain line from shutoff valve to plumbing drain, full size of blow down connection.
- G. Locate Y-type strainers in supply line ahead of the following equipment, and elsewhere as indicated, if integral strainer is not included in equipment, or if suction diffuser is not indicated.

3.2 INSTALLATION OF FABRICATED PIPING SPECIALTIES:

- A. Sleeves: Install pipe sleeves of type indicated where piping passes through walls, floors, ceilings and roofs. Do not install sleeves through structural members of work, except as detailed on drawings, or as reviewed by Architect/Engineer. Install sleeves accurately centered on pipe runs. 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. Where insulation includes vapor-barrier jacket, provide sleeve with sufficient clearance for installation.
 - 1. Install sheet-metal sleeves at interior partitions and ceilings other than suspended ceilings.
 - 2. Install iron-pipe sleeves at exterior penetrations, both above and below grade.
 - 3. Install steel-pipe or plastic-pipe sleeves except as otherwise indicated.
- B. Sleeve Seals: Install in accordance with the following:

1. Mechanical Sleeve Seals: Loosely assemble rubber links around pipe with bolts and pressure plates located under each bolt head and nut. Push into sleeve and center. Tighten bolts until links have expanded to form watertight seal.

3.3 SPARE PARTS:

- A. Furnish to Owner, with receipt, one valve key for each key operated hydrant, bibb, or faucet installed.

END OF SECTION 221119

SECTION 221123 - NATURAL GAS PIPING SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of domestic water piping required by this section is indicated on drawings and/or specified in other Division 22 sections or as required to provide a complete system.

1.2 QUALITY ASSURANCE:

- A. Plumbing Code Compliance: Comply with Kentucky State Plumbing Code and pertaining to plumbing materials, construction and installation of products. Also comply with all state and local codes having jurisdiction. No work shall begin until the Contractor has approved plumbing plans. The Contractor is responsible for installing the indicated systems in accordance with code, therefore any modifications to the project required by the Division of Plumbing shall be considered as part of this project and shall be made at no increase in contract price.

1.3 DELIVERY STORAGE, AND HANDLING:

- A. Where possible, store pipe and tube inside and protected from weather. Where necessary to store outside, elevate above grade and enclose with durable, waterproof wrapping. Maintain end-caps through shipping, storage and handling as required to prevent pipe-end damage and eliminate dirt and moisture from inside of pipe and tube.
- B. Protect flange and fittings from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

1.4 SUBMITTALS:

- A. Product Data: Submit catalog cuts, specifications, installation instructions, and dimensioned drawings for each type of valve, specialty, etc. Include pressure drop curve or chart for each type and size of equipment.

PART 2 - PRODUCTS

2.1 BASIC IDENTIFICATION:

- A. Building Distribution Piping: Plastic pipe markers.
- B. Gas Valves: Brass valve tags.

2.2 BASIC PIPE, TUBE AND FITTINGS:

- A. Exterior Gas Piping:

1. All Pipe Sizes: Galvanized steel pipe, Schedule 40 with Wrought-steel, threaded fittings.

B. Underground Exterior Gas Service Piping:

1. Pipe Sizes ½" Through 4": Thermoplastic gas pressure pipe, tubing, and fittings complying with ANSI/ASTM D 2513. All joining methods shall be as approved by the International Mechanical Code and Kentucky State Code Revisions. All underground thermoplastic pipe shall be provided with No. 18 AWG copper tracer wire with yellow insulation.

C. Building Distribution Piping:

1. Pipe Size 2" and Smaller: Black steel pipe, Pipe Weight: Schedule 40 with Malleable iron threaded fittings.
2. Pipe Size 2½" and Larger: Black steel pipe, Schedule 40 with Wrought-steel butt welded fittings.

D. PRESSURE REGULATORS

1. Regulators: Fisher Type Y600, or equal natural gas pressure reducing regulator with internal pressure registration, and vented and screened spring case. Construction to be as follows: Cast iron body, replaceable seat, vented spring casing, nitrile rubber seat, neoprene rubber diaphragm, and neoprene rubber closing gap gasket.
2. Over-pressure Protection: Provide over-pressure protection for all gas system devices per NFPA 54. Vent to exterior atmosphere as per NFPA 54.
3. All exterior located pressure regulators located outside shall be painted with two (2) coats of a corrosion prevention painting system, such as a high-zinc content - Carboline or equal painting system.

2.3 SPECIAL VALVES

- A. Gas Cocks 2" and Smaller: 150 PSI non-shock WOG, bronze straightway cock, flat or square head, threaded ends.
- B. Gas Cocks 2½" and Larger: 125 PSI non-shock WOG, iron body bronze mounted, straightway cock, square head, flanged ends.
- C. Seismic Automatic Gas Shut-off Valve: Little Firefighter Series AVG.

PART 3 - EXECUTION

3.1 INSTALLATION OF NATURAL GAS PIPING:

- A. Use sealants on metal gas piping threads which are chemically resistant to natural gas. Use sealants sparingly, and apply to only male threads of metal joints.
- B. Remove cutting and threaded burrs before assembling piping.
- C. Do not install defective piping or fittings. Do not use pipe with threads which are chipped, stripped or damaged.
- D. Plug each gas outlet, including valves, with threaded plug or cap immediately after installation and retain until continuing piping, or equipment connection are completed.
- E. Ground gas piping electrically and continuously within project, and bond tightly to grounding connection.

3.2 Install drip-legs in gas piping where indicated, and where required by code or regulation.

- A. Install "Tee" fitting with bottom outlet plugged or capped, at bottom of pipe risers.
- B. Use dielectric unions where dissimilar metals are joined together.
- C. Install piping with 1" drop in 60' pipe run (0.14%) in direction of floor.

3.3 GAS SERVICE:

- A. General: Coordinate service with Civil Drawings and arrange with Utility Company to provide gas service to indicated location with shutoff valve at terminus. Consult with Utility as to extent of it's work, costs, fees and permits involved. Pay such costs and fees; obtain permits. Extend pipe to gas meter location indicated; provide parts and accessories required by utility to connect meter. Provide exterior support stands for support of meter setting and piping/valving.
- B. Provide shutoff outside building where indicated. Provide a pressure reducing valve at line before entering building and reduce to pressure suitable for serving gas-fired appliances.

3.4 EQUIPMENT CONNECTIONS:

- A. General: Connect gas piping to each gas-fired equipment item, with drip leg and shutoff gas cock. Comply with equipment manufacturer's instructions.

3.5 PIPING TESTS:

- A. Test natural gas piping in accordance with ANSI B31.2, and local utility requirements.

END OF SECTION 221123

SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of sanitary waste and vent piping required by this section is indicated on drawings and/or specified in other Division 22 sections or as required to provide a complete system.

1.2 QUALITY ASSURANCE:

- A. Plumbing Code Compliance: Comply with applicable portions of Kentucky State Plumbing Code and pertaining to plumbing materials, construction and installation of products. Also comply with all state and local codes having jurisdiction. No work shall begin until the Contractor has approved plumbing plans. The Contractor is responsible for installing the indicated systems in accordance with code, therefore any modifications to the project required by the Division of Plumbing shall be considered as part of this project and shall be made at no increase in contract price.

PART 2 - PRODUCTS

2.1 PLUMBING PIPING MATERIALS:

- A. Soil, waste & vent: Piping materials to be as below:
 - 1. Soil and waste piping may be Schedule 40 PVC and pipe fittings.
 - 2. Vent piping above ceiling to be Cast iron standard weight no-hub, or Type 'L' copper. All above ceiling areas are return air plenums.
 - 3. Vent piping concealed fully in chases may be Schedule 40 PVC, where not exposed to interior open spaces or the above ceiling plenum.

2.2 Condensate Waste: Condensate waste piping from the interior and exterior HVAC units to be Type M copper.

2.3 CLEANOUTS

- A. All **floor cleanouts** shall be Jay R. Smith #4051 series, coated cast iron, with square Nikaloy top, hub outlet with gasket, of sizes required. It shall be the responsibility of this contractor to determine the type of floor covering to be used at each cleanout location, and to rough-in and install each cleanout flush with the finished floor construction.

- B. All **wall cleanouts** shall be Jay R. Smith #4472 series, with round stainless steel access cover, center screw and recessed bronze tapped plug, of sizes required.
- C. All **cleanouts for installation exterior to the building** where required by the drawings or code, shall be Jay R. Smith #4237-U, full size of line, cast iron, hub outlet, heavy duty round cast iron tractor cover with vandal proof screw.
- D. Approved equivalent Josam, Zurn, or Wade is acceptable.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION;

- A. Pipe shall be accurately cut from job measurements and shall be neatly aligned, securely connected, and properly supported. Piping shall be thoroughly cleaned before installation. Joints shall be made in a workmanlike manner according to good pipe fitting practices.
- B. Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Locate runs as shown or described by diagrams, details and notations or, if not otherwise indicated, run piping in shortest route which does not obstruct usable space or block access for servicing building and its equipment.
- C. Do not use wire or perforated metal to support piping, and do not support piping from other piping, ductwork or other supported mechanical or electrical items. Install hangers and supports to provide indicated pipe slopes.

3.2 CLEANOUTS:

- A. Cleanouts shall be installed at points as noted on the drawings, as well as at the foot of each soil, waste or interior downspout stack, minimum every 80 feet in horizontal soil and waste lines, and at other points as required for easy system maintenance. Cleanouts shall be full size of the pipe up to 4", and 4" size for pipe above 4" size. Grease all cleanout plugs.
- B. Cleanouts and/or test tees concealed in inaccessible pipe spaces, walls and other locations shall have an eight (8) inch by eight (8) inch (minimum) access panel or cover plates shall be set flush with finished floors and walls and shall be key or screw driver operable.
- C. Access panels for cleanouts shall be of the Zurn, 1460 series or equivalent by Josam or Wade. Where they are not to receive paint, they shall be polished bronze unless otherwise indicated where they are to receive paint or other finishes. They may, at the Contractor's

option, be Perma-Coated steel, prepared to receive finish.

- D. Cleanouts and access panels shall be sized so as to permit the entry of a full sized rodding head capable of one hundred percent circumferential coverage of the line served.
- E. Provide a non-hardening mixture of graphite and grease on threads of all screwed cleanouts during installation.
- F. Do not install cleanouts against walls, partitions, etc. where rodding will be difficult or impossible. Extend past the obstruction. Hold a minimum of 12" from all walls.
- G. In finished walls, floors, etc., insure that cleanouts are installed flush with finished surfaces and, where required, grout or otherwise finish in a neat and workmanlike manner.

3.3 FLOOR DRAINS

- A. Provide floor drains at locations indicated and/or as required by Kentucky Building Code. Install in a neat and workmanlike manner. Coordinate locations with appropriate persons or party to insure floor pitch to drain where required.
- B. Each floor drain located on floors above the lowest floor shall to provided complete with flashing and clamping collar.
- C. Ensure by coordination with the appropriate persons or party that spaces served by a floor drain(s) has a water seal extending at least three (3) inches from the floor of the space served on all floors above the lowest level.
- D. The floor drains shall be Zurn, Josam, Wade, Ancon or equivalent, as specified on the Drawings.

3.4 TESTING:

- A. All waste piping shall be tested with all stacks filled with water, and any other tests required by the Plumbing Inspector. All lines, joints, flanges, etc., shall be leak tight.
- B. Repair piping systems sections which fail required piping test, by disassembly and re-installation, using new materials to extent required to overcome leakage.
- C. Drain test water from piping systems after testing and repair work has been completed.

END OF SECTION 221316

SECTION 223400 – GAS FIRED WATER HEATERS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of water heater work required by this section is indicated on drawings and schedules, and by requirements of this section.

1.2 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacturer of electric water heaters, of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. ASME Compliance: Construct water heaters in accordance with American Society of Mechanical Engineers (ASME) Pressure Vessel Codes, where such requirements is indicated.
- C. UL Labels: Provide electrical water heaters which have been listed and labeled by Underwriters Laboratories (UL).

1.3 PRODUCT DELIVERY, STORAGE, AND HANDLING:

- A. Handle water heaters carefully to prevent damage, breaking, and scoring. Store heaters and equipment in clean dry place. Protect from weather, dirt, fumes, water, construction debris and physical damage.

PART 2 - PRODUCTS

2.1 DOMESTIC WATER HEATERS

- A. Water heaters to be gas-fired with power vented combustion chambers. Provide water heaters with glass-lined tank, steel jacket, polyurethane foam insulation, magnesium or equal anode protection, and ASME temperature & pressure relief valves. Provide 120 volt blower assembly with electronic burner ignition and electronic control module. The heater shall be suitable for sealed combustion direct venting using a 2" diameter PVC flue exhaust pipe. Provide all venting accessories recommended and certified by the manufacturer, and vent in strict conformance to the manufacturer's listing. Heaters shall be certified by A.G.A. and shall meet ASHRAE energy Standard 90.1. Minimum tank warranty shall be five (5) years.

END OF SECTION 223400

SECTION 224000 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of plumbing fixture work required by this section is indicated on drawings and schedules, and by requirements of this section.

1.2 SUBMITTALS:

- A. Product Data: Submit manufacturer's specifications for plumbing fixtures, equipment and trim, including catalog cut of each fixture type and trim item furnished, roughing-in dimensioned drawings, templates for cutting substrates, fixture carriers and installation instructions.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES:

- A. General: Provide factory-fabricated fixtures of type, style and material indicated. For each type fixture, provide fixture manufacturer's standard trim and valves as indicated by their published product information; either as designed and constructed, or as recommended by the manufacturer, and as required for a complete installation. Where type is not otherwise indicated, provide fixtures complying with governing regulations.
- B. Fixtures shall be set firm and true, connected to all required piping services ready to use; all fixtures shall be left clean.

2.2 PLUMBING FITTINGS, TRIM AND ACCESSORIES:

- A. Water Outlets: At locations where water is supplied (by manual, automatic or remote control), provide commercial quality faucets, valves, or dispensing devices, of type and size indicated, and as required to operate as indicated. Include manual shutoff valves and connecting stem pipes to permit outlet servicing without shutdown of water supply piping systems.
- B. P-Traps: Include adjustable and removable P-traps where drains are indicated for direct connection to drainage system.
- C. Vacuum Breakers: Provide with flush valves where required by governing regulations, including locations where water outlets are equipped for hose attachment.

- D. Carriers: Provide carriers indicated, or if not indicated, provide cast-iron supports for fixtures of either graphite gray iron, ductile iron, or malleable iron as required.
- E. Fixture Bolt Caps: Provide manufacturer's standard exposed fixture bolt caps finished to match fixture finish.
- F. Escutcheons: Where fixture supplies and drains penetrate walls in exposed locations, provide chrome plated cast-brass escutcheons with set screw.
- G. All faucets, stops and fittings must be of one manufacturer with interchangeable parts, unless otherwise specified.

PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION:

- A. Examine roughing-in work of domestic water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Also examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping, and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected.
- B. Install plumbing fixtures of types indicated where shown and at indicated heights; in accordance with fixture manufacturer's written instructions, roughing-in drawings, and with recognized industry practices. Ensure that plumbing fixtures comply with requirements and serve intended purposes. Comply with applicable requirements of the Kentucky State and local codes pertaining to installation of plumbing fixtures.
- C. Fasten plumbing fixtures securely to indicated supports or building structure; and ensure that fixtures are level and plumb. Secure plumbing supplies behind or within wall construction so as to be rigid, and not subject to pull or push movement.

3.2 CLEAN AND PROTECT:

- A. Clean plumbing fixtures of dirt and debris upon completion of installation.
- B. Protect installed fixtures from damage during the remainder of the construction period.

3.3 FIELD QUALITY CONTROL:

- A. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise,

remove and replace with new units and proceed with retesting.

END OF SECTION 224000

SECTION 230500: COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS:

- A. All requirements under Division One and the General and Supplementary Conditions of these specifications shall be a part of this section. Each contractor shall be responsible to thoroughly familiarize himself with all its contents as to requirements which affect this division or section. The work required under this section includes all material, equipment, appliances, transportation, services, and labor required to complete the entire system as required by the drawings and specifications.

1.2 SCOPE

- A. The work included in this division consists of the furnishing of all labor, equipment, transportation, supplies, material, appurtenances and services necessary for the satisfactory installation of the complete and operating Mechanical System(s)/Equipment indicated or specified in the Contract Documents.
- B. Any materials, labor, equipment or services not mentioned specifically herein which may be necessary to complete or perfect any part of the Mechanical Systems in a substantial manner, in compliance with the requirements stated, implied or intended in the drawings and, or specifications, shall be included as part of this Contract.
- C. It is the intent of this Contract to deliver to the Owners a "like new" project once work is complete. Although plans and specifications are complete to the extent possible, it shall be the responsibility of the Contractors involved to coordinate all new systems with items of construction provided by others, and to relocate items which interfere with new equipment or materials required for the complete installation without additional cost to the Owner.

1.3 DEFINITIONS AND ABBREVIATIONS

- A. Contractor - Any Contractor whether proposing or working independently or under the supervision of a General Contractor and, or Construction Manager and who installs any type of mechanical work (Controls, Plumbing, HVAC, Boiler Work, Sprinkler, Air Systems, etc.) or, the General Contractor.
- B. Engineer - The Consulting Mechanical-Electrical Engineers either consulting to the Owners, Architect, other Engineers, etc.

- C. Architect - The Architect of Record for the project.
 - D. Furnish - Deliver to the site in good condition and turn over to the Contractor who is to install.
 - E. Provide - Furnish and install complete, tested and ready for operation.
 - F. Indicated - Shown on the Drawings or Addenda thereto.
 - G. Typical - Where indicated repeat this work, method or means each time the same or similar condition occurs whether indicated or not.
 - H. OSHA - Office of Safety and Health Administration.
 - I. NEC - National Electrical Code.
 - J. NFPA - National Fire Protection Association.
 - K. AGA - American Gas Association
 - L. ASME - American Society of Mechanical Engineers.
 - M. ANSI - American National Standards Institute.
 - N. ASHRAE - American Society of Heating, Refrigeration and Air Conditioning Engineers.
 - O. NEMA - National Electrical Manufacturers Association.
 - P. UL - Underwriters Laboratories.
- 1.4 INSPECTION OF THE SITE:
- A. The contractor shall personally inspect the site of the proposed work and inform himself fully as to the conditions under which the work is to be done. Failure to do so will not be considered sufficient justification to request or obtain extra compensation over and above the contract price.
- 1.5 MATERIAL AND WORKMANSHIP:
- A. All material and apparatus shall be new and in first class condition. All workmanship shall be of the finest possible by experienced mechanics. All installations shall be made in a manner that will comply with applicable Codes and laws. Any abnormal noise caused by

rattling equipment, piping, ducts, air devices, and squeaks in rotating components will not be acceptable. In general, all materials and equipment shall be of commercial specification grade in quality.

1.6 DRAWINGS AND SPECIFICATIONS

- A. The drawings are diagrammatic only and indicate the general arrangement of the systems and are to be followed. If deviations from the layouts are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted to the Engineer for approval before proceeding with the work. The drawings are not intended to show every item which may be necessary to complete the systems. All proposers shall anticipate that additional items may be required and submit their bid accordingly.
- B. Each Contractor shall make all his own measurements in the field and shall be responsible for correct fitting. He shall coordinate this work with all other branches of work in such a manner as to cause a minimum of conflict or delay.
- C. The Engineer shall reserve the right to make adjustments in location of piping, ductwork, equipment, etc. where such adjustments are in the interest of improving the project.
- D. Unless dimensioned, the mechanical drawings only indicate approximate locations of equipment, piping, ductwork, etc.. Dimensions given in figures on the drawings shall take precedence over scaled dimensions and all dimensions, whether given in figures or scaled, shall be verified in the field to insure no conflict with other work.

1.7 COORDINATION:

- A. Coordinate all work with that of other trades so that the various components of the systems will be installed at the proper time, will fit the available space, and will allow proper service access to those items requiring maintenance. Any components which are installed without regard to the above shall be relocated at no additional cost to the owner.
- B. It is the Contractor's responsibility to provide materials with trim which will fit properly the types of ceiling, wall, or floor finishes actually installed. Model numbers in specifications or shown on drawings are not intended to designate the required trim.

1.8 ORDINANCES AND CODES:

- A. Comply with National Fire Protection Association codes, Kentucky Building Code, International Mechanical Code, and/or all other applicable codes and ordinances. Obtain and pay for all permits. Contractor shall be held responsible for any violation of the law.

- B. The Contractor shall give all necessary notices, obtain and pay for all permits, government sales taxes, fees, inspections and other costs, in connection with his work. He shall also file all necessary plans, prepare all documents and obtain all necessary approvals of all governmental departments having any jurisdiction, whether indicated or specified or not.
- C. The contractor shall also obtain all required certificates of inspection for his work and deliver same to the Engineers before request for acceptance and final payment for the work. Contractor shall submit all required documents to obtain boiler permit and inspection.

1.9 PROTECTION OF EQUIPMENT:

- A. Adequately protect equipment from damage after delivery to job. Cover with heavy polyethylene plastic as required to protect from plaster, dirt, paint, water, or physical damage. Equipment which has been damaged by construction activities will be rejected, and contractor is obligated to furnish new equipment of a like kind.
- B. Keep premises broom clean at all times from foreign material created under this contract. All piping, equipment, etc. shall have a neat and clean appearance at the termination of the work.

1.10 EQUIPMENT AND MATERIALS SUBSTITUTIONS OR DEVIATIONS

- A. When any Contractor requests approval of materials and/or equipment of different physical size, capacity, function, color, access, it shall be understood that such substitution, if approved, will be made without additional cost to anyone other than the Contractor requesting the change regardless of changes in connections, space requirements, electrical characteristics, etc. from that indicated, electrical service, etc.. In all cases where substitutions affect other trades, the Contractor requesting such substitutions shall advise all such Contractors of the change and shall renumerate them for all necessary changes in their work.
- B. NOTE: Any drawings, Specifications, Diagrams, etc., required to describe and coordinate such substitutions or deviations shall be professionally prepared at the responsible Contractor's expense. Review of Shop Drawings by the Engineers does not in any way absolve the Contractor of this responsibility.
- C. Notwithstanding any reference in the specifications to any article, device, product, material, fixture, form, or type of construction by name, make or catalog number, such reference shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition; any devices, products, materials, fixtures, forms, or types of construction which, in the judgment of the Engineer, are equivalent to those

specified are acceptable, provided the provisions of the paragraph immediately preceding are met. Requested substitutions shall be submitted to the Engineer a minimum of five days prior to bids.

1.11 SUPERVISION OF WORK

- A. Each Contractor shall personally supervise the work for which he is responsible or have a competent superintendent, approved by the Engineers, on the work at all times during progress with full authority to act for him.

1.12 SHOP DRAWINGS:

- A. Submit for approval eight sets of manufacturers shop drawings of all major items of equipment and all items requiring coordination between contractors. Before submitting shop drawings and material lists, the contractor shall verify that all equipment submitted is mutually compatible and suitable for the intended use, and shall fit the available space and allow ample room for maintenance. The Engineer's checking and subsequent approval of such shop drawings shall not relieve the contractor from responsibility for errors in dimensions, details, size of members, or quantities; or omissions of components or fittings; or for coordinating items with actual building conditions. Provide any needed wiring diagrams.
- B. Catalog data must have the item or model number clearly marked and all accessories indicated. Mark out all inapplicable items.
- C. **NOTE: Any shop drawings received without being reviewed and stamped by the Contractor shall be returned Rejected without review.**

1.13 OPERATION AND MAINTENANCE INSTRUCTIONS:

- A. Submit to the architect four (4) copies each of material for maintenance and operation instruction manuals, appropriately bound into manual form including approved copies of the following, revised if necessary to show system and equipment as actually installed:
 - a) Manufacturers Catalog Sheets
 - b) Wiring Diagrams
 - c) Maintenance Instructions
 - d) Recommended Maintenance Schedules and Timelines
 - e) Operating Instructions
 - f) Parts Lists
 - g) Preventative Maintenance Recommendations

- B. All maintenance schedules and recommendations shall be developed in full coordination with the Engineer. All binders shall be as per the applicable Division I General Specifications, unless such specifications are not included or are not as stringent as the below requirements.

1.14 GUARANTEE:

- A. Each Contractor shall guarantee all equipment, apparatus, materials, and workmanship entering into this Contract to the best of its respective kind and shall replace all parts at his own expense, which are proven defective for a duration as indicated in the Division I General Conditions and Specifications.
- B. Where such duration is not identified, then guarantee shall be for one year from final acceptance of the work by the Engineer/Architect. The effective date of completion of the work shall be the date of the Engineer's (Architect's) Statement of Substantial Completion. Items of equipment which have longer guarantees, as called for in these specifications, shall have warranties and guarantees completed in order, and shall be in effect at the time of final acceptance of the work by the Engineer. The Contractor shall present the Engineer with such warranties and guarantees at the time of final acceptance of the work. The Engineer shall then submit these warranties, etc. to the Owner. Refer to other sections for any special or extra warranty requirements.

1.15 RECORD DRAWINGS

- A. Each Contractor shall insure that any deviations from the Design are as they occur recorded in red, erasable pencil on record drawings kept at the jobsite. The Engineer may review the record documents from time to time to insure compliance with this specification. Compliance shall be a contingency of final payment. Pay particular attention to Deviations in the Control Systems. Keep information in a set of drawings set aside at the job site especially for this purpose and deliver to the Engineers the originals and three (3) copies of the record drawings upon completion of the work. Delivery of these documents will be contingent of final payment.

1.16 QUALIFICATIONS OF WORKMEN

- A. All mechanical work shall be accomplished by qualified workmen competent in the area of work for which they are responsible. Mechanical contractors shall be licensed as required by Kentucky State Law. All boiler and piping work to be performed by a Contractor licensed to do boiler work in State of Kentucky.
- B. All sheet metal, insulation and pipe fitting work shall be installed by workmen normally engaged or employed in these respective trades.

- C. All electrical work shall be installed only by competent workmen under direct supervision of a fully qualified Electrician.

1.17 CONDUCT OF WORKMEN

- A. Each Contractor shall be responsible for the conduct of all workmen under his supervision. Misconduct on the part of any workman to the extent of creating a safety hazard, or endangering the lives and property of others, shall result in the prompt relief of that workman. The consumption of alcoholic beverages or other intoxicants, narcotics, barbiturates, hallucinogens or debilitating drugs on the job site is strictly forbidden.

1.18 CONCRETE BASES

- A. Each Contractor shall be finally responsible for the provisions of all concrete work required for the installation of any of his systems or equipment. He may, at his option, arrange with the others to provide the work. This option, however, will not relieve the Contractor of his responsibilities relative to dimensions, quality of workmanship, locations, etc.. In the absence of other concrete specifications, all concrete related to Mechanical work shall be 3000 psi minimum compression strength at 28 days curing and shall conform to the standards of the American Concrete Institute Publication AC1-318.
- B. Contractor shall furnish concrete bases for his equipment where indicated on the drawings. Concrete housekeeping pads shall be minimum 4" thick, reinforced with 6 x 6 wire mesh, and have chamfered edges.

1.19 ROUGH-IN:

- A. Coordinate without delay all roughing-in with general construction. All piping, conduit, rough-in shall be concealed except in unfinished areas and where otherwise shown.

1.20 CUTTING AND PATCHING:

- A. This contractor shall do all cutting of walls, floors, ceilings, etc. as required to install work under this section. Contractor shall obtain permission of the Architect before doing any cutting. All holes shall be cut as small as possible. Contractor shall patch walls, floors, etc. as required by work under this section. All patching shall be thoroughly first class and shall match the original material and construction.

1.21 ACCESSIBILITY

- A. The Contractor shall locate and install all equipment so that it may be serviced, and

maintained as recommended by the manufacturer. Allow ready access and removal of the entire unit and/or parts such as valves, filters, fan belts, motors, prime shafts, etc.

1.22 ELECTRICAL WIRING:

- A. All power conduit and wiring shall be furnished by the electrical contractor. All control and interlock conduit and wiring for mechanical systems is the responsibility of the Mechanical Contractor; however he may choose to hire an electrician to perform this work. All wiring shall be in conduit and in accordance with the National Electric Code.

1.23 REQUIRED CERTIFICATIONS

- A. Upon completion of the project, the Contractor shall deliver all inspection certificates acquired during the course of the project to the Owner for their records.
- B. The Contractor shall upon completion of the Final Punch list, deliver to Architect and Engineer a written certification that all systems and work has been completed in compliance with the plans and specifications. The Contractor also shall deliver over to the Owner all required maintenance manuals and phone numbers of the equipment suppliers. The delivery of these documents and certifications will be required prior to final payment and release of retainage.

1.24 INDEMNIFICATION

- A. The Contractor(s) shall hold harmless and indemnify the Engineer, employees, officers, agents and consultants from all claims, loss, damage, actions, causes of actions, expense and/or liability resulting from, brought for, or on account of any personal injury or property damage received or sustained by any person, persons, (including third parties), or any property growing out of, occurring, or attributable to any work performed under or related to this contract, resulting in whole or in part from the negligence of the Contractor, any subcontractor, any employee, agent or representative.

PART 2 - PRODUCTS

NONE

PART 3 - EXECUTION

NONE

END OF SECTION 230500

SECTION 230507: EXCAVATION, TRENCHING, AND BACKFILLING FOR HVAC

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. Excavation and Backfilling:

1. Do all excavation of all materials encountered including rock required for work under this section. Backfill all trenches, tamping well in 6" layers. System shall be tested, made tight and accepted before backfill. Remove from premises all excess material not used in backfilling. Repair all streets, sidewalks, drives, paving, etc. damaged. Repair materials shall generally match existing construction. All backfilling and repairing shall meet all requirements of the city and others having jurisdiction. Repair work shall be thoroughly first class.
2. Extent of earthwork is to be determined from work indicated on the drawings.
3. Backfilling of trenches is included as part of this work.

1.2 QUALITY ASSURANCE:

- A. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

1.3 JOB CONDITIONS:

- A. Site Information: Complete data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity. It is expressly understood that Owner will not be responsible for interpretations or conclusions drawn from any available data. Classification of Rock: Unclassified.
- B. Should uncharted, or incorrectly charted piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
- C. Provide minimum of one week notice to Architect/Engineer and Owner, and receive written notice to proceed before interrupting any utility.
- D. Use of Explosives:
1. The use of explosives is not permitted.
- E. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post warning lights.

- F. Operate warning lights as recommended by authorities having jurisdiction. No trenches shall be left open without wood planks capable of supporting 250 pounds (one man) being placed over the open sections.
- G. Protect structures, utilities, retaining walls, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.
- H. Perform excavation within drip-line of large trees to remain by hand, and protect the root system from damage or dryout to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with burlap. Paint root cuts of 1" diameter and larger with emulsified asphalt tree paint.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 SOIL MATERIALS:

A. Definitions:

1. Suitable soil: Soil deemed suitable by the Architect.
2. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, natural or crushed sand.
3. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100% passing a 1½" sieve and not more than 5% passing a No. 4 sieve.
4. Backfill and Fill Materials: Satisfactory soil materials free of clay, rock or gravel larger than 2" in any dimension, debris waste, frozen materials, vegetable and other deleterious matter.

3.2 EXCAVATION:

- A. Excavation consists of removal and disposal of material encountered when establishing required piping elevations.
- B. Excavation Classifications: The trenching and excavation specified in this section shall be Unclassified. All rock encountered in the installation of piping and conduits shall be removed at no increase in contract price.

- C. Dewatering: Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.
- D. 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. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
- E. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.
- F. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees.
- G. Dispose of excess soil material and waste materials as herein specified.
- H. Excavation for Trenches: Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room.
- I. Excavate trenches to depth indicated or required.
- J. Do not backfill trenches until tests and inspections have been made and backfilling authorized by Architect, Engineer and local authority having jurisdiction. Use care in backfilling to avoid damage or displacement of pipe systems.
- K. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35°F. (1°C).

3.3 COMPACTION:

- A. General: Control soil compaction during construction providing minimum percentage of density specified for each area classification.
- B. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum dry density for soils which exhibit a well-defined moisture density relationship determined in accordance with ASTM D 698; and not less than the following percentages of relative density, determined in accordance with ASTM D 2049, for soil which will not exhibit a well-defined moisture-density relationship.
- C. Compact top 6" of subgrade and each layer of backfill or fill material at 90% maximum dry density.
- D. Moisture Control: When subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer

of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.

- E. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
- F. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by dicing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.4 BACKFILL AND FILL:

- A. General: Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.
- B. In excavations, use satisfactory excavated or borrow material.
- C. Under piping and conduit, use subbase material where subbase is indicated under piping or conduit; shape to fit bottom 90° of cylinder.
- D. Backfill excavations as promptly as work permits, but not until completion of the following:
 - E. Inspection, testing, approval, and recording locations of underground utilities.
 - F. Removal of shoring and bracing, and backfilling of voids with satisfactory materials.
 - G. Removal of trash and debris.
- H. Placement and Compaction: Place backfill and fill materials in layers not more than 8" in loose depth for material compacted by heavy compaction equipment, and not more than 4" in loose depth for material compacted by hand operated tampers.
- I. Before compaction, moisten each layer as necessary to provide suitable moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

3.5 MAINTENANCE:

- A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- B. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality and

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

3.6 DISPOSAL OF EXCESS AND WASTE MATERIALS:

1. Remove excess excavated material, trash, debris and waste materials and dispose of it off Owner's property.

END OF SECTION 220507

SECTION 230517 - PIPING SPECIALTIES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of piping specialties required by this section is indicated on drawings and/or specified in other Division 15 sections or as required to provide a complete system.
- B. Types of piping specialties specified in this section include the following:
 - 1. Pipe Escutcheons
 - 2. Dielectric Unions.
 - 3. Sleeves.
 - 4. Sleeve Seals.

1.2 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacturer of piping specialties of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

1.3 SUBMITTALS:

- A. Product Data: Submit catalog cuts, specifications, installation instructions, Also submit dimensioned drawings for pipeline strainers. Include pressure drop curve or chart for each type and size of pipeline strainer. Submit schedule showing manufacturer's figure number, size, location and features for each required pipeline strainer.
- B. Maintenance Data: Submit maintenance data and spare parts lists for each type of pipeline strainer. Include this data in Maintenance Manual.

PART 2 - PRODUCTS

2.1 MANUFACTURED PIPING SPECIALTIES:

- A. General: Provide factory-fabricated piping specialties recommended by manufacturer for use in service indicated. Provide piping specialties of types, pressure ratings, voltage and wattage indicated for each service, or if not indicated, provide proper selections as determined by Engineer to comply with installation requirements. Provide sizes as indicated, and connections, which properly interface with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Installer's option.
- B. Pipe Escutcheons, General: Provide pipe escutcheons as specified herein with inside

diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings, and pipe sleeve extension, if any. Furnish pipe escutcheons with nickel or chrome finish for occupied areas, prime paint finish for unoccupied areas.

- C. Pipe Escutcheons for Dry Areas: Provide sheet steel escutcheons, solid or split hinged.
- D. Dielectric Unions, General: Provide standard products recommended by manufacturer for use in service indicated, which effectively isolate ferrous from non-ferrous piping (electrical conductance), prevent galvanic action, and stop corrosion.
- E. Available Manufacturers: Subject to compliance with requirements, manufacturers offering dielectric unions which may be incorporated in the work include, but are not limited to the following:
 - 1. Atlas Products Co.
 - 2. Capital Mfg. Co., Div. of Harsco Corp.
 - 3. Eclipse, Inc.
 - 4. Epco Sales, Inc.
 - 5. FMC Corp.
 - 6. McNally, Inc.
 - 7. PSI Industries.
 - 8. Stockham Valves and Fittings.

2.2 FABRICATED PIPING SPECIALTIES:

- A. Pipe Sleeves: Provide pipe sleeves of one of the following:
- B. Sheet-Metal: Fabricate from galvanized sheet metal; round tube closed with snaplock joint, welded spiral seams or welded longitudinal joint. Fabricate from the following gages: 3" and smaller, 20 gage; 4" to 6", 16 gage; over 6", 14 gage.
- C. Steel-Pipe: Fabricate from Schedule 40 galvanized steel pipe; remove burrs.
- D. Iron-Pipe: Fabricate from cast-iron or ductile-iron pipe, remove burrs.
- E. Sleeve Seals: Provide sleeve seals for sleeves located in foundation walls below grade, or in exterior walls, of one of the following:
- F. Mechanical Sleeve Seals: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.
- G. Available Manufacturers: Subject to compliance with requirements, manufacturers

offering mechanical sleeve seals which may be incorporated in the work include, but are not limited to the following:

1. Thunderline Corp.

PART 3 - EXECUTION

3.1 INSTALLATION OF MANUFACTURED PIPING SPECIALTIES:

- A. Pipe Escutcheons: Install pipe escutcheons on each pipe penetration thru floors, walls, partitions, and ceilings where penetration is exposed to view; and on exterior of building. Secure escutcheon to pipe or insulation so escutcheon covers penetration hole and is flush with adjoining surface
- B. Dielectric Unions: Install at each piping joint between ferrous and non-ferrous piping. Comply with manufacturer's installation instructions.

3.2 INSTALLATION OF FABRICATED PIPING SPECIALTIES:

- A. Sleeves: Install pipe sleeves of type indicated where piping passes through walls, floors, ceilings and roofs. Do not install sleeves through structural members of work, except as detailed on drawings, or as reviewed by Architect/Engineer. Install sleeves accurately centered on pipe runs. 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. Where insulation includes vapor-barrier jacket, provide sleeve with sufficient clearance for installation.
- B. Install sheet-metal sleeves at interior partitions and ceilings other than suspended ceilings.
- C. Install iron-pipe sleeves at exterior penetrations, both above and below grade.
- D. Install steel-pipe or plastic-pipe sleeves except as otherwise indicated.

3.3 Sleeve Seals: Install in accordance with the following:

- A. Mechanical Sleeve Seals: Loosely assemble rubber links around pipe with bolts and pressure plates located under each bolt head and nut. Push into sleeve and center. Tighten bolts until links have expanded to form watertight seal.

END OF SECTION 230517

SECTION 230519: METERS AND GAGES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of gauges and thermometers required by this section is indicated on drawings and/or specified in other Division 22 sections.

1.2 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacturer of pressure gauges and thermometers, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

1.3 SUBMITTALS:

- A. Product Data: Submit catalog cuts, specifications, and installation instructions, for each type of measuring device required. Submit showing Manufacturer's figure number, size, and features for each required device.

PART 2 - PRODUCTS

2.1 TEMPERATURE GAGES:

- A. Direct Mount Dial Thermometers:
 - 1. General: Provide direct mount dial thermometers of materials, capacities, and ranges indicated, designed and constructed for use in service indicated.
 - 2. Type: Vapor tension, universal angle.
 - 3. Case: Drawn steel or brass, clear acrylic plastic lens, 4½" diameter.
 - 4. Adjustable Joint: Die cast aluminum, 180° adjustment in vertical plane, 360° adjustment in horizontal plane, with locking device.
 - 5. Thermal Bulb: Copper with phosphor bronze bourbon pressure tube, on scale division accuracy.
 - 6. Movement: Brass precision geared.
 - 7. Scale: Progressive, satin faced, non-reflective aluminum, permanently etched markings.
 - 8. Stem: Copper plated steel, or brass, for separable socket, length to suit

installation.

9. Range: Conform to the following:
 - a. Hot Water & Condenser Water: 40° - 240°F (10°-115°C).
10. Available Manufacturers: Subject to compliance with requirements, manufacturers offering direct mount dial thermometers which may be incorporated in the work include, but are not limited to the following:
 - a. Marsh Instrument Co., Unit of General Signal.
 - b. Trerice (H.O.) Co.
 - c. Weiss (Albert A. & Son, Inc.

B. Dial Type Insertion Thermometers:

1. General: Provide dial type insertion thermometers of materials, capacities, and ranges indicated, designed and constructed for use in service indicated.
2. Type: Bi-metal, stainless steel case and stem, 1" diameter dial, dust and leak proof, 1/8" diameter stem with nominal length of 5".
3. Accuracy: 0.5% of dial range.
4. Range: Conform to the following:
 - a. Hot Water: 0°- 220°F (-10°-110°C).
5. Available Manufacturers: Subject to compliance with requirements, manufacturers offering direct mount dial type insertion thermometers which may be incorporated in the work include, but are not limited to the following:
 - a. Marsh Instrument Co., Unit of General Signal.
 - b. Taylor Instrument Process Control Div., Sybron Corp.
 - c. Trerice (H.O.) Co.
 - d. Weiss (Albert A.) & Son, Inc.

C. Thermometer Wells:

1. General: Provide thermometer wells constructed of brass or stainless steel, pressure rated to match piping system design pressure. Provide 2" extension for insulated piping.

2.2 PRESSURE GAGES AND FITTINGS:

- A. General: Provide pressure gages of materials, capacities and ranges indicated, designed

and constructed for use in service indicated.

- B. Type: General use, 1% accuracy, ANSI B 40.1 grade A, phosphor bronze bourdon type, bottom connection.
- C. Case: Drawn steel or brass, clear acrylic plastic lens, 4½" diameter.
- D. Connector: Brass with ¼" male NPT. Provide protective syphon when used for steam service.
- E. Scale: White coated aluminum, with permanently etched markings.
- F. Range: Conform to the following:
 - 1. HVAC Water: 0 - 100 PSI.
- G. Available Manufacturers: Subject to compliance with requirements, manufacturers offering pressure gages which may be incorporated in the work include, but are not limited to the following:
 - 1. Ametek, U.S. Gauge Div.
 - 2. Marsh Instrument Co., Unit of General Signal.
 - 3. Marshalltown, An Eltra Company
 - 4. Terice (H.O.) Co.
 - 5. Weiss (Albert A.) & Son, Inc.
- H. Pressure Gage Cocks:
 - 1. General: Provide pressure gage cocks between pressure gages and gage tees on piping systems. Construct gage cock of brass with ¼" female NPT on each end, and "T" handle brass plug.
 - 2. Snubber: ¼" brass bushing with corrosion resistant porous metal disc, through which pressure fluid is filtered. Select disc material for fluid served and pressure rating.
- I. Pressure Gage Connector Plugs:
 - 1. General: Provide pressure gage connector plugs pressure rated for 150 PSI and 200°F. Construct of brass and finish in nickel-plate, equip with ½" NPT fitting, with self-sealing valve core type neoprene gasketed orifice suitable for inserting 1/8" O.D. probe assembly from dial type insertion pressure gage. Equip orifice with gasketed screw cap and chain. Provide extension, length equal to insulation thickness, for insulated piping.

PART 3 - EXECUTION

3.1 INSTALLATION OF TEMPERATURE GAGES:

- A. General: Install temperature gages in vertical upright position, and tilted so as to be easily read by observer standing on floor.
- B. Locations: Install at the following locations, and elsewhere as indicated:
 - 1. At inlet and outlet of boilers
 - 2. At supply and return to the cooling tower.
 - 3. At supply and return of condenser water into mechanical room
- C. Thermometer Wells: Install in piping tee where indicated, in vertical upright position. Fill well with oil or graphite, secure cap.

3.2 INSTALLATION OF PRESSURE GAGES:

- A. General: Install pressure gages in piping tee with pressure gage cock, located on pipe at most readable position.
- B. Locations: Install in the following locations, and elsewhere as indicated:
 - 1. At suction and discharge of each new hydronic pump.
 - 2. At discharge of each pressure reducing valve.
 - 3. At inlet and outlet of boiler.
 - 4. At supply and return to the cooling tower.

END OF SECTION 230519

SECTION 230523 - VALVES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of valves required by this section is indicated on drawings and/or specified in other Division 15 sections.
- B. Types of valves specified in this section include the following:
 - 1. Gate Valves.
 - 2. Globe Valves.
 - 3. Drain Valves.
 - 4. Ball Valves.
 - 5. Butterfly Valves.
 - 6. Swing and Lift Check Valves.

1.2 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacturer of valves, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

1.3 SUBMITTALS:

- A. Product Data: Submit catalog cuts, specifications, installation instructions, and dimensioned drawings for each type of valve. Include pressure drop curve or chart for each type and size of valve. Submit valve schedule showing Manufacturer's figure number, size, location, and valve features for each required valve.

PART 2 - PRODUCT

2.1 VALVES:

- A. General: Provide factory-fabricated valves recommended by manufacturer for use in service indicated. Provide valves of types and pressure ratings indicated; provide proper selection as determined by Installer to comply with installation requirements. Provide sizes as indicated, and connections which properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Installer's option.

2.2 GATE VALVES:

- A. Packing: Select valves designed for repacking under pressure when fully opened, equipped with packing suitable for intended service. Select valves designed so back seating protects packing and stem threads from fluid when valve is fully opened, and

equipped with gland follower.

B. For Hot Water & Condenser Water Services:

1. Threaded Ends 2" and Smaller: Class 125, bronze body, union bonnet, rising stem, solid wedge.
2. Flanged Ends 2½" and Larger: Class 125, iron body bronze mounted, bolted bonnet, rising stem, OS&Y, solid wedge.
3. Soldered Ends 2" and Smaller" Class 125, bronze body, screwed bonnet, non-rising stem, solid wedge.

C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering gate valves which may be incorporated in the work include, but are not limited to the following:

1. Crane Co., Valve Div.
2. Fairbanks Co.
3. Hammond Valve Corp., Div. of Conval Corp.
4. Jenkins Bros., A Corp.
5. NIBCO, Inc.
6. Powell (Wm.) Co.
7. Stockham Valves and Fittings, Inc.
8. Walworth Co.

2.3 GLOBE VALVES:

- A. Packing: Select valves designed for repacking under pressure when fully opened, equipped with packing suitable for intended service. Select valves designed so back seating protects packing and stem threads from fluid when valve is fully opened, and equipped with gland follower.
- B. Composition Discs: Where required, provide suitable material for intended service. For stem throttling service, fit composition disc valve with throttling nut.
- C. Comply with the following standards:
1. Bronze Valves: MSS SP-80.
 2. Steel Valves: ANSI B16.34.
- D. For HVAC Hot Water Service:
1. Threaded Ends 2" and Smaller: Class 150, bronze body, union bonnet, rising

stem, composition disc.

2. Soldered Ends 2" and Smaller: Class 125, bronze body, screwed bonnet, rising stem, composition disc.
3. Flanged Ends 2½" and Larger: Class 125, iron body, bolted bonnet, rising stem, OS&Y, renewable seat and disc.
4. Threaded Ends 2" and Smaller (For By-Pass or Throttling): Class 150, bronze body, union bonnet, rising stem, plug type renewable seat and disc.

E. Available Manufacturers: Subject to compliance with requirements, manufacturers offering globe valves which may be incorporated in the work include, but are not limited to, the following:

1. Crane Co., Valve Div.
2. Fairbanks Co.
3. Hammond Valve Corp., Div. of Conval Corp.
4. Jenkins Bros., A Corp.
5. NIBCO, Inc.
6. Powell (Wm.) Co.
7. Stockham Valves and Fittings, Inc.
8. Walworth Co.

2.4 SWING CHECK VALVES:

A. General: Construct pressure containing parts of valves as follows:

1. Bronze Valves, 125 or 150 PSI: ANSI/ASTM B 62.
2. Iron Body Valves: ANSI/ASTM A 126, Grade B.

B. Construct valves of pressure castings free of any impregnating materials.

C. Construct valves of bronze, regrinding, with seating angle 40° to 45°, unless composition disc is specified.

D. Provide stop plug as renewable stop for disc hanger, unless otherwise specified.

E. Construct disc and hanger as separate parts, with disc free to rotate.

F. Support hanger pins on both ends by removable side plugs.

G. For HVAC Hot Water Service:

1. Threaded Ends 2" and Smaller: Class 125, bronze body, screwed cap, horizontal

swing, bronze disc.

2. Flanged Ends 2½" and Larger: Class 125, iron body bronze mounted, bolted cap, horizontal swing, cast iron disc.

H. Available Manufacturers: Subject to compliance with requirements, manufacturers offering swing check valves which may be incorporated in the work include, but are not limited to the following:

1. Crane Co., Valve Div.
2. Fairbanks Co. (The)
3. Hammond Valve Corp., A Condec Co.
4. Jenkins Bros., A Corp.
5. NIBCO, Inc.
6. Powell Co. (The Wm.)
7. Stockham Valves and Fittings, Inc.
8. Walworth Co.

2.5 DRAIN VALVES:

A. For Low Pressure Drainage Service:

1. Threaded Ends 2" and Smaller: Class 125, bronze body, screwed bonnet, rising stem, composition disc, ¾" hose outlet connection.
2. Soldered Ends 2" and Smaller: Class 125, bronze body, screwed bonnet, rising stem, composition disc, ¾" hose outlet connection.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering drain valves which may be incorporated in the work include, but are not limited to, the following:

1. Crane Co., Valve Div.
2. Fairbanks Co.
3. Hammond Valve Corp., Div. of Conval Corp.
4. Jenkins Bros., A Corp.
5. NIBCO, Inc.
6. Walworth, Co.

2.6 LIFT CHECK VALVES:

A. General: Provide lift check valves, 2" and smaller, constructed of bronze or forged steel to suit service. Construct bronze valves with basic saturated steam rating of 125 or 150 PSI with pressure containing parts of materials having at least physical properties of ANSI/ASTM B 62. Conform to ANSI /FCI 74-1 for design, rating, and testing. Construct pressure castings, free of any impregnating materials.

- B. Horizontal Lift Check Valves: ¼" to 2", straight pattern threaded ends, pressure rated for 150 PSI saturated steam, renewable composition disc, screw-over cap, bronze body.
- C. Vertical Lift Check Valves: ¼" to 2", straight vertical pattern, threaded ends, pressure rated for 150 PSI saturated steam, renewable composition disc, screw-in hub, bronze body.
- D. Spring Loaded Horizontal Lift Check Valves: ¼" to 2", straight pattern, threaded ends, pressure rated for 150 PSI saturated steam, renewable composition disc, phosphor bronze wire spring, screw over cap, bronze body.
- E. Available Manufacturers: Subject to compliance with requirements, manufacturers offering lift check valves which may be incorporated in the work include, but are not limited to the following:
 - 1. Fairbanks Co. (The).
 - 2. Hammond Valve Corp., A Condec Co.
 - 3. Jenkins Bros., A Corp.
 - 4. Lunkenheimer Co. (The), Div. Conval Corp.
 - 5. Powell Co. (The Wm.).
 - 6. Stockham Valves & Fittings, Inc.

2.7 BALL VALVES:

- A. General: Select with port area equal to or greater than connecting pipe area, include seat ring designed to hold sealing material.
- B. For HVAC Hot Water Service:
 - 1. Threaded Ends 3" and Smaller: Class 125, bronze 2 piece body, bronze ball, bronze stem.
 - 2. Soldered Ends 2" and Smaller: Class 125, bronze 2 piece body, bronze ball, bronze stem.
- C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering ball valves which may be incorporated in the work include, but are not limited to the following:
 - 1. Conbraco Industries, Inc.
 - 2. Crane Co., Valve Div.
 - 3. Fairbanks Co.
 - 4. Hammond Valve Corp., Div. of Conval Corp.
 - 5. Jamesbury Corp.
 - 6. NIBCO, Inc.

7. Stockham Valves and Fittings, Inc.
8. Walworth Co.

2.8 DRAIN VALVES:

A. For Low Pressure Drainage Service:

1. Threaded Ends 2" and Smaller: Class 125, bronze body, screwed bonnet, rising stem, composition disc, 3/4" hose outlet connection.
2. Soldered Ends 2" and Smaller: Class 125, bronze body, screwed bonnet, rising stem, composition disc, 3/4" hose outlet connection.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering drain valves which may be incorporated in the work include, but are not limited to, the following:

1. Crane Co., Valve Div.
2. Fairbanks Co.
3. Hammond Valve Corp., Div. of Conval Corp.
4. Jenkins Bros., A Corp.
5. NIBCO, Inc.
6. Walworth, Co.

2.9 BUTTERFLY VALVES:

A. General: Comply with MSS SP-67. Where butterfly valves are used as shutoffs for terminal or equipment removal or repair, select lug type valves. Select wafer type valves for other applications. Provide gear operators on butterfly valves 8" and larger.

B. For HVAC Hot and Condenser Water Service:

1. Wafer Type 3" and Larger: Class 150, cast iron body, lever operated, cadmium plated ductile iron disc, Type 410 stainless steel stem, EPT seat.
2. Lug Type 3" and Larger: Class 150, ductile iron body, lever operated, cadmium plated ductile iron disc, Type 410 stainless steel stem, EPT seat.

C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering butterfly valves which may be incorporated in the work include, but are not limited to the following:

1. Crane Co., Valve Div.
2. Demco, Inc.
3. Fairbanks Co.
4. Jenkins Bros., A Corp.

5. Mark Controls Corp., MCC Centerline
6. NIBCO, Inc.
7. Stockham Valves and Fittings, Inc.

2.10 SWING CHECK VALVES:

- A. General: Construct pressure containing parts of valves as follows:
 1. Bronze Valves, 125 or 150 PSI: ANSI/ASTM B 62.
 2. Metallic Seated Bronze Valves, 200 or 300 PSI: ANSI/ASTM B 61.
 3. Iron Body Valves: ANSI/ASTM A 126, Grade B.
- B. Comply with MSS SP-71 for design, workmanship, material and testing.
- C. Construct valves of pressure castings free of any impregnating materials. Construct valves of bronze, regrounding, with seating angle 40° to 45°, unless composition disc is specified.
- D. Provide stop plug as renewable stop for disc hanger, unless otherwise specified.
- E. Construct disc and hanger as separate parts, with disc free to rotate.
- F. Support hanger pins on both ends by removable side plugs.
- G. For HVAC Hot Water & Condenser Water Service:
 1. Threaded Ends 2" and Smaller: Class 125, bronze body, screwed cap, horizontal swing, bronze disc.
 2. Soldered Ends 2" and Smaller: Class 125, bronze body, screwed cap, horizontal swing, bronze disc.
 3. Flanged Ends 2½" and Larger: Class 125, iron body bronze mounted, bolted cap, horizontal swing, cast iron disc.
- H. Available Manufacturers: Subject to compliance with requirements, manufacturers offering swing check valves which may be incorporated in the work include, but are not limited to the following:
 1. Crane Co., Valve Div.
 2. Fairbanks Co. (The)
 3. Hammond Valve Corp., A Condec Co.
 4. Jenkins Bros., A Corp.

5. NIBCO, Inc.
6. Powell Co. (The Wm.)
7. Stockham Valves and Fittings, Inc.
8. Walworth Co.

2.11 LIFT CHECK VALVES:

- A. General: Provide lift check valves, 2" and smaller, constructed of bronze or forged steel to suit service. Construct bronze valves with basic saturated steam rating of 125 or 150 PSI with pressure containing parts of materials having at least physical properties of ANSI/ASTM B 62. Conform to ANSI /FCI 74-1 for design, rating, and testing. Construct pressure castings, free of any impregnating materials.
 1. Horizontal Lift Check Valves: ¼" to 2", straight pattern threaded ends, pressure rated for 150 PSI, renewable composition disc, screw-over cap, bronze body.
 2. Vertical Lift Check Valves: ¼" to 2", straight vertical pattern, threaded ends, pressure rated for 150 PSI, renewable composition disc, screw-in hub, bronze body.
- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering lift check valves which may be incorporated in the work include, but are not limited to the following:
 1. Fairbanks Co. (The).
 2. Hammond Valve Corp., A Condec Co.
 3. Jenkins Bros., A Corp.
 4. Lunkenheimer Co. (The), Div. Conval Corp.
 5. Powell Co. (The Wm.).
 6. Stockham Valves & Fittings, Inc.

2.12 VALVE FEATURES:

- A. General: Provide valves with features indicated and, where not otherwise indicated, provide proper valve features as determined by Installer for installation requirements. Comply with ANSI B31.1
 1. Bypass: Comply with MSS SP-45, and except as otherwise indicated, provide manufacturer's standard bypass piping and valving.
 2. Drain: Comply with MSS SP-45, and provide threaded pipe plugs complying with Division 15 "Pipe, Tube, and Fittings" section.
 3. Outside Screw and Yoke: Stem and handwheel designed to rise out of bonnet or yoke as valve is operated from closed to open position.

4. Inside Screw, Non-Rising Stem: Stem and handwheel designed to rotate without rising when valve is operated from closed to open position.
 5. Flanged: Valve flanges complying with ANSI B16.1 (cast iron), ANSI B16.5, (steel), or ANSI B16.24 (bronze).
 6. Threaded: Valve ends complying with ANSI B2.1.
 7. Mechanical Actuator: Factory-fabricated gears, gear enclosure, external chain attachment and chain designed to provide mechanical advantage in operating valve.
 8. Bonnet: Part of gate or globe valve through which stem passes to valve body, and attached to valve body by screws, bolts, union or welding.
 9. Solid Wedge: One piece tapered disc in gate valve, designed for contact on both sides.
 10. Outside Screw and Yoke: Stem and handwheel designed to rise out of bonnet or yoke as valve is operated from closed to open position.
 11. Inside Screw, Non-Rising Stem: Stem and handwheel designed to rotate without rising when valve is operated from closed to open position.
- B. Valve System: Select and install valves with outside screw and yoke stems, except provide inside screw non-rising stem valves where headroom prevents full opening of OS&Y valves.
- C. Renewable Seats: Select and install valves with renewable seats, except where otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Except as otherwise indicated, comply with the following requirements:
- B. Install valves where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary.
- C. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward for horizontal plane unless unavoidable. Install valve drains with hose end adapter for each valve that must be installed with stem below horizontal plane.

- D. Insulation: Where insulation is indicated, install extended stem valves, arranged in proper manner to receive insulation.
- E. Applications Subject to Shock: Install valves with bodies of metal other than cast iron where thermal or mechanical shock is indicated or can be expected to occur.
- F. Valve System: Select and install valves with outside screw and yoke stems, except provide inside screw non-rising stem valves where headroom prevents full opening of OS&Y valves.
- G. Fluid Control: Except as otherwise indicated, install gate, ball, globe and butterfly valves to comply with ANSI B31.1. Where throttling is indicated or recognized as principal reason for valve, install globe valves.
- H. Installation of Check Valves:
 - 1. Swing Check Valves: Install in horizontal position with hinge pin horizontally perpendicular to center line of pipe. Install for proper direction of flow.

END OF SECTION 230523

SECTION 230529 - PIPING SUPPORTS AND ANCHORS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of supports, anchors and seals required by this section is indicated on drawings and/or specified in other Division 15 sections.
- B. Types of supports, anchors, and seals specified in this section include the following:
 - 1. Horizontal-Piping Hangers and Supports.
 - 2. Vertical-Piping Clamps.
 - 3. Hanger-Rod Attachments.
 - 4. Building Attachments.
 - 5. Saddles and Shields.
 - 6. Miscellaneous Materials.
 - 7. Anchors.
- C. Supports, anchors, and seals furnished as part of factory-fabricated equipment, are specified as part of the equipment assembly in other Division 15 sections. Also refer to Division 15 specifications dealing with seismic control and vibration isolation; also work of this section.

1.2 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacturer of supports, anchors, and seals, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Select and apply pipe hangers and supports, complying with MSS SP-69. Size hangers and supports to support pipe weight and fluid conveyed.

PART 2 - PRODUCTS

2.1 HORIZONTAL-PIPING HANGERS AND SUPPORTS:

- A. General: Except as otherwise indicated, provide factory fabricated horizontal-piping hangers and supports complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping.

- B. Adjustable Steel Clevises: MSS Type 1.
- C. Alloy Steel Pipe Clamps: MSS Type 2.
- D. Steel Double Bolt Pipe Clamps: MSS Type 3.
- E. Steel Pipe Clamps: MSS Type 4.
- F. Pipe Hangers: MSS Type 5.
- G. Adjustable Swivel Pipe Rings: MSS Type 6.
- H. Adjustable Steel Band Hangers: MSS Type 7.
- I. Adjustable Band Hangers: MSS Type 9.
- J. Extension Split Pipe Clamps: MSS Type 12.
- K. Pipe Saddle Supports: MSS Type 36, including steel pipe base support and cast-iron floor flange.
- L. Pipe Stanchion Saddles: MSS Type 37, including steel pipe base support and cast-iron floor flange.
- M. Adjustable Pipe Saddle Supports: MSS Type 38 including steel pipe base support and cast-iron floor flange.
- N. Single Pipe Rolls: MSS Type 41.
- O. Pipe Roll Stands: MSS Type 44.
- P. Adjustable Roller Hangers: MSS Type 43.
- Q. Pipe Rolls and Plates: MSS Type 45.

2.2 VERTICAL-PIPING CLAMPS:

- A. General: Except as otherwise indicated, provide factory fabricated vertical-piping clamps complying with ANSI/MSS SP-58, of one of the following types listed, selected by Installer to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe.
- B. Two-Bolt Riser Clamps: MSS Type 8.
- C. Four-Bolt Riser Clamps: MSS Type 42.

2.3 HANGER-ROD ATTACHMENTS:

- A. General: Except as otherwise indicated, provide factory fabricated hanger-rod attachments complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping hangers and building attachments, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hanger-rod attachments to suit hanger rods.
- B. Steel Clevises: MSS Type 14.
- C. Swivel Turnbuckles: MSS Type 15.
- D. Steel Weldless Eye Nuts: MSS Type 17.

2.4 BUILDING ATTACHMENTS:

- A. General: Except as otherwise indicated, provide factory fabricated building attachments complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit building substrate conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods.
- B. Top Beam C-Clamps: MSS Type 19.
- C. Side Beam or Channel Clamps: MSS Type 20.
- D. Welded Attachments: MSS Type 22.
- E. C-Clamps: MSS Type 23.
- F. Top I-Beam Clamps: MSS Type 25.
- G. Side I-Beam Clamps: MSS Type 27.
- H. Steel I-Beam Clamps W/Eye Nut: MSS Type 28.
- I. Steel WF-Beam Clamps W/Eye Nut: MSS Type 29.
- J. Steel Brackets: One of the following for indicated loading:
 - a. Light Duty: MSS Type 31.
 - b. Medium Duty: MSS Type 32.

c. Heavy Duty: MSS Type 33.

K. Side Beam Brackets: MSS Type 34.

L. Plate Lugs: MSS Type 57.

M. Horizontal Travelers: MSS Type 58.

2.5 SADDLES AND SHIELDS:

- A. General: Except as otherwise indicated, provide saddles or shields for piping hangers and supports, factory-fabricated, for all insulated piping. Size saddles and shields for exact fit to mate with pipe insulation.
- B. Protection Saddles: MSS Type 39; fill interior voids with segments of insulation matching adjoining insulation.
- C. Protection Shields: MSS Type 40; of length recommended by manufacturer to prevent crushing of insulation.

2.6 MANUFACTURERS OF HANGERS AND SUPPORTS:

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering hangers and supports which may be incorporated in the work include, but are not limited to the following:
 - 1. C & S Mfg. Corp.
 - 2. Carpenter and Patterson, Inc.
 - 3. Elcen Metal Products Co.
 - 4. F & S Central Mfg. Corp.
 - 5. Fee & Mason Mfg. Co., Div. of A-T-O, Inc.
 - 6. ITT Grinnel Corp.

2.7 MISCELLANEOUS MATERIALS:

- A. Metal Framing: Provide products complying with NEMA STD ML 1.
- B. Steel Plates, Shapes and Bars: Provide products complying with ANSI/ASTM A 36.
- C. Heavy-Duty Steel Trapezes: Fabricate from steel shapes selected for loads required; weld steel in accordance with AWS Standards.
- D. Pipe Guides: Provide factory-fabricated guides, of cast semisteel or heavy fabricated steel, consisting of a bolted two section outer cylinder and base with a two-section

guiding spider bolted tight to pipe. Size guide and spiders to clear pipe and insulation (if any), and cylinder. Provide guides of length recommended by manufacturer to allow indicated travel.

PART 3 - EXECUTION

3.1 INSTALLATION OF HANGERS AND SUPPORTS:

- A. General: Install hangers, supports, clamps and attachments to support piping properly from building structure; comply with MSS SP-69. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Install supports with maximum spacings complying with MSS SP-69. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping, ductwork or other supported mechanical or electrical items.
- B. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and style as installed for adjacent similar piping.
- C. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated, or by other recognized industry methods.
- D. Provisions for Movement:
 - 1. Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.
- E. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
- F. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes, and so that maximum pipe deflections allowed by ANSI B31 are not exceeded.
- G. Insulated Piping: Comply with the following installation requirements.
- H. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.
- I. Saddles: Where insulation without vapor barrier is indicated, install protection saddles.

END OF SECTION 230529

SECTION 220533 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of mechanical identification work required by this sections indicated on drawings and/or specified in other Division 15 sections. Systems which must be identified are as follows:

1. Exterior ERV Unit.
2. MAU Unit
3. Hydronic Heat Pump Units
4. Duct Heater
5. Hydronic Pumps
6. Boilers
7. Natural Gas Piping
8. Control Panels

- B. Type of identification devices specified in this section include the following:

1. Engraved Plastic-Laminate Signs
2. Pipe Identification

1.2 SUBMITTALS

- A. Product Data: Submit product specifications and installation instructions for each identification material and device required.

PART 2 - PRODUCTS

2.1 MECHANICAL IDENTIFICATION MATERIALS:

A. PIPE STENCILING

1. Provide stenciled markers and arrows indicating direction of flow on all piping installed under this Contract after the piping has been painted. Markers and arrows shall be painted on the piping using machine cut stencils. All letters shall be sprayed using fast drying lacquer paint. All markers and arrows shall be properly oriented so that descriptive name may be easily read from the floor.

B. VALVE TAGS:

1. Provide the following:
 - a. Brass Valve Tags: Provide 19 gauge polished brass valve tags with stamp engraved piping system abbreviation in 1/4" high letters and sequenced valve numbers 1/2" high, and with 5/32" hole for fastener. Provide 1 1/2" diameter tags, except as otherwise indicated.
 - b. Valve Tag Fasteners: Manufacturer's standard solid brass chain (wire link or headed type), or solid brass S-hooks of the sizes required for proper attachment of tags to valves, and manufactured specifically for that purpose.

C. ENGRAVED PLASTIC-LAMINATE SIGNS:

1. General: Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in the sizes and thicknesses indicated, engraved with engraver's standard letter style of the sizes and wording indicated, black with white core (letter color) except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate. Thickness: 1/16" for units up to 20 sq. in. or 8" length; 1/8" for larger units. Fasteners: Self-tapping stainless steel screws, expect contact-type permanent adhesive where screws cannot or should not penetrate the substrate.

2.2 LETTERING AND GRAPHICS:

- A. General: Coordinate names, abbreviations and other designations used in mechanical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturer's or as required for proper identification and operation/maintenance of mechanical systems and equipment. Lettering in no case shall be less than 1/2" in height.

PART 3 - EXECUTION

3.1 APPLICATION AND INSTALLATION:

A. PIPING & VALVING:

1. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and

painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

2. Locate pipe markers as follows wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums), exterior exposed locations and above removable acoustical ceilings.
 - a. Near each valve and control device.
 - b. Near locations where pipes pass through walls or floors/ceilings, or enter non-accessible enclosures.
 - c. Near major equipment items and other points of origination and termination.
 - d. Spaced intermediately at maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment.
3. Valve Identification General: Provide valve tag on every valve, cock and control device in each piping system listed under the paragraph entitled "DESCRIPTION OF WORK"; exclude check valves, valves within factory-fabricated equipment units, and shut-off or isolation valves at equipment. List each tagged valve in valve schedule for each piping system.
4. Mount valve schedule frames and schedules in machine rooms where indicated or, if not otherwise indicated, where directed by the Architect/Engineer.
5. Do not use plastic piping markers where located in a return air plenum.

3.2 PIPE PAINTING AND IDENTIFICATION

- A. Piping shall be required to be painted and identified as follows:
 1. Domestic Hot Water: Black Letters on a Yellow Background: " DOM. HOT "
 2. Natural Gas Piping: Yellow Letters on a Green Background: " N.GAS "
- B. All other piping systems shall be painted to match adjacent surfaces or shall be painted white.

3.3 MECHANICAL EQUIPMENT:

- A. Mechanical Equipment Identification, General: Install engraved plastic laminate sign on or near each major item of mechanical equipment and each operational device, as specified herein.

1. MAU Units
2. Boilers
3. Pumps
4. Heat Pump Units
5. Energy Recovery Units
6. Duct Heater

- B. Heat Pump units above the ceiling may be identified with black painted stencils, with letters 3" minimum in size. Also provide a unique identifying number on the terminal units that corresponds to the identifier used for the central temperature control system.
- C. Provide colored thumbtacks on bottom of ceiling tiles below heat pump units to designate locations of units.

END OF SECTION 220533

SECTION 230548 - VIBRATION CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of vibration isolation work required by this section is indicated on drawings and schedules, and/or specified in other Division 15 sections.
- B. Types of vibration isolation products specified in this section include the following:
 - 1. Flexible Duct Connectors.
 - 2. Neoprene Equipment Pads
 - 3. Isolation Hangers
 - 4. Flexible Pipe Connectors
- C. Vibration isolation products furnished as part of factory-fabricated equipment, are specified as part of the equipment assembly in other Division 15 sections.

1.2 QUALITY ASSURANCE:

- A. Product Qualification: Provide each type of vibration isolation unit produced by specialized manufacturer, with not less than 5 years' successful experience in production of units similar to those required for project.

1.3 QUALITY ASSURANCE:

- A. Product Qualification: Provide each type of vibration isolation unit produced by specialized manufacturer, with not less than 5 years' successful experience in production of units similar to those required for project.

PART 2 - PRODUCTS

2.1 ISOLATION MATERIALS AND SUPPORT UNITS:

- A. Fiberglass Pads and Shapes: Glass fiber of not more than 0.18 mil diameter, produced by multiple-flame attenuation process, molded with manufacturer's standard fillers and binders through 10 compression cycles at 3 times rated load bearing capacity, to achieve natural frequency of not more than 12 Hertz, in thickness and shapes required for use in vibration isolation units.
- B. Neoprene Pads: Oil-resistant neoprene sheets, of manufacturer's standard hardness and cross-ribbed pattern, designed for neoprene-in-shear-type vibration isolation, and in

thicknesses required.

- C. Bridge Bearing Neoprene Pads with Steel Plate and Friction Pad: Oil-resistant neoprene sheets, of manufacturer's standard hardness and cross-ribbed pattern, designed for neoprene-in-shear-type vibration isolation, and 3/4" thick. Pads provided with friction pad and steel plate with through hole for bolting. Pads to be Mason Industries WM or equal.
- D. Neoprene Mountings: Double Deflection neoprene mountings with minimum static deflection of 0.35". Provide friction pads for both top and bottom. Provide with bolt hole through center of pad for mounting. Mountings to be Mason Industries ND or equal.
- E. Vibration Isolation Springs: Wound-steel compression springs, of high-strength, heat-treated, spring alloy steel; with outside diameter not less than 0.8 times operating height; with lateral stiffness not less than vertical stiffness; and designed to reach solid height before exceeding rated fatigue point of steel, and to have additional 50% travel to solid. Minimum required deflection shall be 0.75". Spring vibration isolation shall be freestanding and laterally stable without housings. Include studs or cups to ensure centering of spring on plates. Include leveling bolt with lock nuts and washers, centered in top plate, arranged for leveling and anchoring supported equipment as indicated. Include holes in bottom plate for bolting unit to substrate as indicated.
- F. Isolation Hangers: Hanger units formed with brackets and including manufacturer's standard compression isolators of type indicated. Design brackets for 5 times rated loading of units. Fabricate units to accept misalignment of suspension members, and for use with either rod or strap type members, and including acoustical washers to prevent metal-to-metal contacts.
 - 1. Provide neoprene pad or shape, securely retained in unit, with threaded metal top plate.
 - 2. Provide removable spacer in each unit, to limit deflection during installation to rated-load deflection.
- G. Flexible Duct Connectors: Laminated flexible sheet of cotton duct and sheet elastomer (butyl, neoprene or vinyl), reinforced with steel wire mesh where required for strength to withstand duct pressure indicated. Form connectors with full-faced flanges and accordion bellows to perform as flexible isolators unit, and of manufacturer's standard length for each size unless otherwise indicated. Equip each unit with galvanized steel retaining rings for airtight connection with ductwork.
- H. Flexible Pipe Connectors: Flexible stainless steel hose shall have stainless steel braid and carbon steel fittings. Sizes 3" and larger shall be flanged. Smaller sizes

shall have male nipples. Minimum lengths shall be as tabulated:

Flanged		Male Nipples	
3 x 14	10 x 26	1/2 x 9	1 1/2 x 13
4 x 15	12 x 28	3/4 x 10	2 x 14
5 x 19	14 x 30	1 x 11	2 1/2 x 18
6 x 20	16 x 32	1 1/4 x 12	
8 x 22			

1. Hoses shall be installed on the equipment side of the shut-off valves horizontally and parallel to the equipment shafts wherever possible. Hoses shall be type BSS as manufactured by Mason Industries, Inc.
- I. Available Manufacturers: Subject to compliance with requirements, manufacturers offering vibration isolation products, which may be incorporated in the work include, but are not limited to the following:
 1. Peabody Noise Control, Inc.
 2. Korfund Dynamics Corp.
 3. Mason Industries, Inc.
 4. Vibration Eliminator Co., Inc.

PART 3 - EXECUTION

3.1 APPLICATIONS:

- A. General: Except as otherwise indicated, apply the following types of vibration isolators at indicated locations or for indicated items of equipment. Selection is Installer's option where more than one type is indicated.
- B. Neoprene-Pad-Type Isolators: Install where the following equipment is indicated:
 1. Pumps P-1A and P-1B; set pump frame on bridge bearing neoprene pads on top of concrete pad
- C. Flexible Duct Connectors: Install at the following ductwork connections:
 1. Connections with vibration-isolation-mounted air handling equipment (i.e. Energy recovery units, fans, Heat pump units, etc.).
 2. Provide flexible duct connections wherever ductwork connects to vibration isolated equipment or as indicated on the Drawings. Construct flexible connections of neoprene coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint

flexibility to allow for thermal, axial, transverse, and torsional movement, and also capable of absorbing vibrations of connected equipment Duro-Dyne, Elgen, Ventfabric or equal. All canvas connections shall have a flame spread of 25 or less and smoke developed rating not higher than 50.

D. Isolation Hangers: Install where the following suspended equipment is indicated:

1. All hydronic heat pumps

E. Flexible Pipe Connectors: Install at the following connections to equipment:

1. All heat pumps
2. Hydronic Pumps in excess of 5 Hp

F. Vibration Isolation Springs (and Rails): Install at base of cooling tower in accordance with manufacturer's Specifications.

END OF SECTION 230548

SECTION 230593 - TESTING, ADJUSTING AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

- A. Extent of testing, adjusting, and balancing work is indicated by requirements of this section, and also by drawings and schedules, and is defined to include, but is not necessarily limited to, air distribution systems, hydronic distribution systems and associated equipment and apparatus of mechanical work. The work consists of pressure testing, setting speed and volume (flow) adjusting facilities provided for systems, recording data, conducting tests, preparing and submitting reports, and recommending modifications to work as required by contract documents.
- B. Component types of testing, adjusting, and balancing specified in this section includes the following as applied to mechanical equipment:
 - 1. Make-Up Air Units
 - 2. Heat Pump Units
 - 3. Boilers
 - 4. Exhaust/Ventilation Fans
 - 5. Hydronic Pumps
 - 6. Air terminals
 - 7. Energy Recovery Units
 - 8. Piping systems.

1.3 QUALITY ASSURANCE:

- A. Installer: A firm certified by Associated Air Balance Council (AABC) or National Environmental Balance (NEBB) in those testing and balancing disciplines similar to those required for this project. NOTE: No company will be acceptable for this work without PRIOR approval from the Engineer.
- B. Industry Standards: Comply with American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE) recommendations pertaining to measurements, instruments and testing, adjusting and balancing, except as otherwise indicated.

1.4 PRE-QUALIFICATION:

1. Under no circumstances shall a firm perform the test and balance work without being pre-qualified by the Engineer. Failure to provide a firm pre-qualified by the Engineer will result in the Engineer requesting withholding of funds from the Contract to enlist the services of a balancing firm acceptable to the Engineer.
2. Should the Contractor enlist the services of a non-qualified firm, and should balancing services be performed prior to the Engineer's knowledge, then no fees will be paid for these services under the Contract. All fees for balancing services provided without pre-qualification shall be borne by the Contractor without any impact to the Contract price, and the services provided will not be accepted.
3. Firms wishing to be pre-qualified may submit a request to the Engineer for consideration. Acceptance of any firm is strictly at the sole discretion of the Engineer, and no other entity. Engineer will consider past performance, experience and personal judgement in the evaluation of firms requesting to be pre-qualified. Request for pre-qualification must be submitted to the Engineer at least (10) ten days prior to the bid, so that pre-qualified firms may be listed in any Addendum.
4. At present, the firms currently pre-qualified by the Engineer are as follows:
 - a. **Thermal Balance – Lexington, KY**
 - b. **EBCO – Lexington, KY**
 - c. **Synergy – Indianapolis, IN**

1.5 SUBMITTALS:

- A. Submit certified test reports signed by Test and Balance Supervisor who performed TAB work.
- B. Include identification and types of instruments used and their most recent calibration date with submission of final test report.

1.6 JOB CONDITIONS:

- A. Do not proceed with testing, adjusting, and balancing work until work has been completed and is operable. Ensure that there is no latent residual work still to be completed.
- B. Do not proceed until work scheduled for testing, adjusting, and balancing is clean and free from debris, dirt and discharged building materials.
- C. HVAC Testing, Adjusting and Balancing:

1. All equipment shall be adjusted to operate as intended by the specification. All bearings shall be lined up. Bearings that have dirt or foreign material in them shall be replaced with new bearings without additional cost to the owner. All thermostats and control devices shall be adjusted to operate as intended. Adjust burners, fans, etc. for proper and efficient operation. Certify to Engineer that all adjustments have been made and that system is operating satisfactorily. Adjust all supply outlets to supply the amount of air shown on the drawings. Further adjustments shall be made to obtain uniform temperature in all spaces. Calibrate, set, and adjust all automatic temperature controls. Check proper sequencing of all interlock systems, and operation of all safety controls.
2. Contractor shall employ the services of a testing and balancing firm to take test readings on all fans and units, and to adjust fan speeds to deliver specified amounts of air. Testing and balancing report logs shall be made showing all air supply quantities, fan and unit test readings, etc.; (3) three copies of the log shall be submitted to the Engineer before final inspection of the project and is necessary for final payment. Log shall be listed by unit, and shall additionally indicate unit horsepower, motor nameplate amps, and actual amps draw after all adjustments are completed. Also each room shall be listed with total exhaust, supply and return air quantities listed.
3. Patch holes in insulation, ductwork and housings, which have been cut or drilled for test purposes, in manner recommended by original installer.
4. Prepare a report of recommendation for correcting unsatisfactory mechanical performances when system cannot be successfully balanced; including, where necessary, modifications which exceed requirements of contract documents for mechanical work.
5. Retest, adjust and balance systems subsequent to significant system modifications, and resubmit test results.

D. HVAC Hydronic Piping Systems Testing and Balancing:

1. Contractor shall employ the services of a testing and balancing firm to take test readings on all unit balancing valves and orifices, across air handling unit coils, geothermal loops, to adjust valves to deliver specified amounts of water. Testing and balancing report logs shall be made showing water supply quantities; (3) three copies of the log shall be submitted to the Engineer before final inspection of the project and is necessary for final payment. Log shall be listed by units, loop numbers, pumps, etc..

2. Test and balance all hydronic pumps and adjust to proper flow. Record inlet, outlet and total pressure of pumps. record amperage draw and nameplate ratings.
3. Retest, adjust and balance systems subsequent to significant system modifications, and resubmit test results.
4. Thermometers and gauges shall be checked for accuracy. If instruments are proven defective, they shall be replaced.
5. System balancing shall be performed only by persons skilled in this work. The system shall be balanced as often as necessary to obtain desired system operation and results.
6. Prepare report of test results, including instrumentation calibration reports, in format recommended by applicable standards.
7. The Test and Balance Contractor shall assist the Architect/Engineer in verifying that proper measuring instruments and methods were used.

E. Pressure Testing:

1. All water piping shall be tested with 25 PSI over static water pressure but not less than 100 PSI hydrostatic pressure. All waste piping shall be tested with all stacks filled with water, and any other tests required by the Plumbing Inspector. All piping shall be tested before any insulation installed, and before backfill, and shall be subject to the above pressure for an uninterrupted period of not less than 24 hours
2. General: Provide temporary equipment for testing, including pump and gages. Test piping system before insulation is installed. Remove control devices before testing. Test each natural section of each piping system independently, but do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating. Fill each section with water and pressurize for indicated pressure and time.
3. Observe each test section for leakage at end of test period. Test fails if leakage is observed or if pressure drop exceeds 5% of test pressure.
4. Repair piping systems sections which fail required piping test, by disassembly and re-installation, using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.

5. Drain test water from piping systems after testing and repair work has been completed.

END OF SECTION 230593

SECTION 230700: HVAC INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of mechanical insulation required by this section is indicated on drawings, and by requirements of this section.
- B. Types of mechanical insulation specified in this section include the following:
 - 1. Ductwork Insulation:
 - a. Supply Air Duct (where concealed above ceilings)
 - b. Outside and Exhaust Air Ductwork Exterior from ERV Unit
 - c. Flexible duct to diffusers.
 - d. Exterior Cooling Tower Piping
 - e. Exterior Make-Up Water Fill Piping to Tower
 - 2. Piping System Insulation:
 - a. Hot Water Supply and Return from Boilers to Condenser Water Header
 - b. Condensate Piping
 - c. Exterior Cooling Tower Piping
 - d. Exterior Make-Up Water Fill Piping to Tower

1.2 QUALITY ASSURANCE:

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to the following:
 - 1. Babcock & Wilcox Co., Insulating Products Div.
 - 2. Certainteed Corp.
 - 3. Johns-Manville Corp.
 - 4. Keene Corp.
 - 5. Knauf Fiber Glass
 - 6. Owens-Corning Fiberglass Corp.
- B. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread rating of 25 or less, and

smoke-developed rating of 50 or less, as tested by ANSI/ASTM E 84 (NFPA 255) method.

1.3 SUBMITTALS:

- A. Product Data: Submit manufacturer's specifications and installation instructions for each type of mechanical insulation. Submit schedule showing manufacturer's product number, thickness, and furnished accessories for each mechanical system requiring insulation.
- B. Certified Tests: With product data submit certified test reports on performances including burning characteristics and thermal insulating values.

1.4 DELIVERY, STORAGE AND HANDLING:

- A. Deliver insulation, coverings, cements, adhesives, and coatings to site in containers with manufacturer's stamp or label, affixed showing fire hazard ratings of products.
- B. Protect insulation against dirt, water, and chemical and mechanical damage. Do not install damaged insulation; remove damaged insulation from project site.

PART 2 - PRODUCTS

2.1 PIPING INSULATION:

- A. All hot water, exterior cooling tower piping, & condensate piping shall be insulated. The insulation shall be a heavy density, pipe insulation with a K factor .22 at 75°F mean temperature. The insulation shall be wrapped with a vapor barrier jacket with self-sealing lap, equal to Certain-teed, Mansville, Owens-Corning. Cover fittings with Zeston or equal premolded insulating fittings. Insulation shall be installed in a professional, neat appearing manner; poor workmanship shall be corrected at the Contractor's expense.
- B. Application thicknesses shall be as follows:
 - 1. Boiler hot water piping 2" and smaller: 1" thick
 - 2. Cooling Coil Condensate piping: 1/2" thick
 - 3. Exterior Cooling tower Piping (water fill, supply and return piping): 1-1/2" thick (with heat trace)
- C. All exterior cooling tower piping and fill piping to be insulated as indicated and provided with a weatherproof PVC jacketing sealed water-tight. Coordinate work with the

installation of the required heat tape circuits.

2.2 HEAT-TRACING SYSTEM (HEAT TAPE)

- A. Chemelex or RayChem auto trace, self-limiting heater; conductive radiation, cross-linked polymer core with copper bus wire; 8 watts per linear foot at 50°F operating temperature; 2 watt per linear foot at 150°F operating temperature; irradiated polyurethane inner insulation; irradiated polyolefin outer insulating jacket; 208V/1/60; with power connection kit; end seals; two (2) parallel tracings shall be provided; one on each side of the pipe; tracing shall not be spiralled except that 2 feet of tracing shall be wrapped around each valve. Each tracing shall be controlled by independent thermostats set to actuate the tracing element at 36°F pipe temperature.

2.3 DUCT INSULATION FOR SUPPLY AIR, OUTSIDE AIR AND INDICATED EXHAUST AIR DUCTWORK:

- A. Flexible Fiberglass Ductwork Insulation (Outside of Attic): FS HH-I-558, Form B, Type I. Insulation to have a density of 1.5 pcf density and shall have a "k" value of 0.28 maximum at 75 deg. F. Provide all-service insulation jacket with vapor barrier.
- B. Flexible Fiberglass Ductwork Insulation (In Attic): FS HH-I-558, Form B, Type I. Insulation to have a density of 3.0 pcf density and shall have a "k" value of 0.28 maximum at 75 deg. F. Provide all-service insulation jacket with vapor barrier.
- C. Application: Provide thicknesses of insulation on ductwork as follows:
 - 1. Supply Air Duct (where concealed above ceilings): 1.5" thick
 - 2. Outside Air Ductwork Inside: 1.5" thick
- D. Insulation for Exterior Supply/Outside Air, and Exhaust Energy Recovery Unit Ductwork:
 - 1. Exterior ductwork shall be insulated with Flexible Fiberglass Ductwork Insulation: FS HH-I-558, Form B, Type II, Grade 2, Type 100. Insulation to have a density of 1.0 pcf density minimum and shall have a "k" value of 0.27 maximum at 75 deg. F. Insulate supply and return air ductwork with 2" thick flexible insulation wrap. After insulating, two coats of weather barrier mastic reinforced with fabric or mesh for outdoor application shall be applied to the entire surface. Each coat of weatherproof mastic & lagging shall be 1/16 inch minimum thickness, and shall overlap 2" minimum. An exterior sheet metal jacket shall then be applied; the exterior shall be a metal jacketing applied for mechanical abuse and weather protection, and secured with screws.

2. The exterior jacketing shall be smooth sheet aluminum or galvanized steel, 30 gauge. Corrugated jackets shall not be used outdoors. Provide joiner bands and overlapping joints as required to completely protect exterior insulation system. Paint the exterior of the jacketing with a primer and two (2) coats of a color to match the exterior masonry of the adjacent exterior wall; color shall be approved by Architect.
- E. Ductwork Insulation Accessories: Provide staples, bands, wires, tape, anchors, corner and angles and similar accessories as recommended by insulation manufacturer for applications indicated. Provide cements, adhesives, coatings, sealers, protective finishes and similar compounds as recommended by insulation manufacturer for applications indicated.
- F. All insulating materials, adhesives, coatings, etc., shall have a flame spread of 25 or less and smoke developed rating not higher than 50. All containers for mastics and adhesives shall have U.L. Label.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPING INSULATION:

- A. General: Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.
- B. Install insulation materials with smooth and even surface. Insulate each continuous run of piping or ductwork with full-length units of insulation, with single cut piece to complete run. Do not use cut pieces or scraps abutting each other.
- C. Clean and dry all surfaces prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.
- D. Cover valves, fittings and similar items in each piping system with equivalent thickness and composition of insulation as applied to adjoining pipe run. Install factory molded, precut or job fabricated units (at Installer's option) except where specific form or type is indicated.
- E. Install protective metal shields and insulated inserts wherever needed to prevent compression of insulation. Pipe Hanger Insulation Inserts: Butt pipe insulation against pipe hanger insulation inserts.

3.2 INSTALLATION OF DUCTWORK INSULATION:

- A. General: Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose. All ductwork shall be externally insulated unless otherwise indicated.
- B. Install insulation materials with smooth and even surfaces.
- C. Clean and dry ductwork prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.
- D. Maintain integrity of vapor-barrier on ductwork insulation, and protect it to prevent puncture and other damage.
- E. Extend ductwork insulation without interruption through walls, floors and similar ductwork penetrations, except at penetrations through exterior building barriers and where otherwise indicated.
- F. Refer to manufacturer's instructions for additional insulation installation requirements.

3.3 PROTECTION AND REPLACEMENT:

- A. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.
- B. Protection: Insulation Installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

END OF SECTION

SECTION 230800 - COMMISSIONING OF HVAC SYSTEMS

PART 1 - GENERAL

1.1 OVERVIEW

- A. Commissioning (Cx) is the process of ensuring that the new building systems are installed and perform interactively according to the design intent; that systems are efficient and cost effective and meet the Owner's operational needs; that the installation is adequately documented; and that the Operators are adequately trained. It serves as a tool to minimize post-occupancy operational problems. It establishes testing and communication protocols in an effort to advance the building systems from installation to full dynamic operation and optimization.

1.2 SCOPE

- A. Development of a Commissioning plan
- B. Set-up and Conduct Initial CxA Kick-off meeting
- C. Review of all equipment and controls installation and operations manuals.
Review of all equipment and controls start-up procedures
- D. Drafting of Prefunctional Testing Check-list Procedures for controls and equipment
- E. Conduction of Prefunctional testing with Contractor and SubContractors.
Drafting of PreFunctional Report
- F. Drafting of Functional Testing Check-list Procedures for controls and equipment
- G. Conduction of any required interim progress review visits.
- H. Conduction of Functional testing with Contractor and SubContractors, once all Prefunctional Requirements are complete.
- I. Conduct two week Operational Test after Functional test
- J. Issuance of Final Report

1.3 SUBMITTALS

- A. SUBMITTAL PROCEDURES

1. Prior to scheduling initial commissioning kick-off meeting, provide commissioning plan.
2. Submit pre-functional and functional check lists once drafted.
3. Test Schedule: Schedule for pre-commissioning checks and functional performance tests, at least 2 weeks prior to the start of pre-commissioning checks and functional performance tests.
4. Submit interim report after precommissioning/prefunctional checklists are complete.
5. Completed pre-commissioning checklists and functional performance test checklists organized by system and by subsystem and submitted as one package. The results of failed tests shall be included along with a description of the corrective action taken.
6. Submit Final Report after two week operational tests are complete.

B. SEQUENCING AND SCHEDULING

1. The functional testing work described in this Section shall begin only after all work required for the equipment to fully function as intended has been completed including Testing and Balancing.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 COMMISSIONING TEAM AND CHECKLISTS

- A. The Contractor shall designate team members to participate in the pre-commissioning checks and the functional performance testing specified herein
 1. The team members shall be as follows:
 - a. Contractor's Mechanical Representative
 - b. Contractor's Electrical Representative
 - c. Contractor's Commissioning Agency (if retained)
 - d. Contractor's Testing, Adjusting, and Balancing Representative
 - e. Contractor's Controls Representative
 - f. Design Agent's Representative
- B. The Mechanical Contractor in consultation with the Engineer, Temperature Controls Contractor, and Test & Balancing contractor shall develop check lists that must be complete. Each checklist shall be completed by the commissioning

team. Acceptance by each commissioning team member of each pre-commissioning checklist item shall be indicated by initials and date unless an "X" is shown indicating that participation by that individual is not required. Acceptance by each commissioning team member of each functional performance test checklist shall be indicated by signature and date

3.2 TESTS

- A. The pre-commissioning checks and functional performance tests shall be performed in a manner which essentially duplicates the checking, testing, and inspection methods established in the related Sections. Where checking, testing, and inspection methods are not specified in other Sections, methods shall be established which will provide the information required. The Contractor shall provide all materials, services, and labor required to perform the pre-commissioning checks and functional performance tests. A pre-commissioning check or functional performance test shall be aborted if any system deficiency prevents the successful completion of the test or if any participating commissioning team member of which participation is specified is not present for the test.
- B. Pre-Commissioning Checks
 - 1. Pre-commissioning checks shall be performed for the items indicated on the checklists developed. Deficiencies discovered during these checks shall be corrected and retested in accordance with the applicable contract requirements
- C. Functional Performance Tests
 - 1. Functional performance tests shall be performed for the items indicated on the checklists developed during construction with the Engineer. Functional performance tests shall begin only after all pre-commissioning checks have been successfully completed. Tests shall prove all modes of the sequences of operation, and shall verify all other relevant contract requirements. Tests shall begin with equipment or components and shall progress through subsystems to complete systems. Upon failure of any functional performance test checklist item, the Contractor shall correct all deficiencies in accordance with the applicable contract requirements. The checklist shall then be repeated until it has been completed with no errors
- D. Intent:
 - 1. It is the intent for each and every device to be tested to prove that each item of the required control sequence specified is proven to function correctly, and that the proper amount of air/water/gas, etc. is provided in the amounts required. This includes proving that all temperature sensors

pressure sensors, switches, dampers, equipment staging, monitoring, functional software, etc. are fully proven to function in accordance with the design intent, and control sequences. This shall include the following pieces of equipment:

- a. Make-up air unit
- b. ERV unit
- c. Hydronic heat pumps
- d. Circulating Pumps
- e. Boilers & Boiler Pumps
- f. Cooling Tower
- g. Controls

END OF SECTION 230800

SECTION 230900 - AUTOMATIC TEMPERATURE CONTROL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions Specifications section, apply to work of this section.

1.2 DESCRIPTION OF WORK:

- A. Extent of electronic temperature control systems work is indicated by drawings and details, and by requirements of this section.
- B. The temperature controls Contractor shall include setting the DDC control backbone up onto the library LAN for remote interface through IP. Coordinate all required connectivity, passwords and firewall security with Library's computer personnel.

1.3 QUALITY ASSURANCE:

- A. Manufacturers: A firm regularly engaged in manufacture of electric and DDC temperature control equipment, of types and sizes, which have been in satisfactory use for not less than 5 years, in similar service.
- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering pneumatic temperature control systems which may be incorporated in the work include, but are not limited to the following:
 - 1. Honeywell, Inc.
 - 2. Johnson Controls, Inc.
 - 3. Seimens Corporation
 - 4. Automated Logic
 - 5. Trane Company

1.4 SUBMITTALS:

- A. Product Data: Submit manufacturer's specifications for each control device, including installation instructions and start-up instructions.
- B. Shop Drawings: Submit layout drawings of installed temperature control system including thermostats, controllers, switches, etc.. showing accurately scaled components and their relation to associated equipment, and connections. Submit shop drawings for each control system, containing the following information:
- C. Schematic flow diagram of system showing equipment, valves and control devices.

- D. Label each control device with setting or adjustable range of control. Indicate all required electrical wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.
- E. Provide details of faces of control panels, including controls, instruments, and labeling.
- F. Include verbal description of sequence of operation.

1.5 Operation and Maintenance Instructions:

- A. This Contractor shall prepare three (3) loose-leaf, bound brochures, entitled "Automatic Temperature Control and Monitoring Systems -- Operation and Maintenance Data." Mark identification on both front and spine of each binder. Each binder shall be a heavy duty 3-ring, vinyl-covered binder with pocket folders for folded sheet information. Binders shall be properly indexed (thumb-tabbed).
- B. Each brochure shall contain the following information:
 - 1. Name and address of Contractor, and index of equipment, including vendor (name and address).
 - 2. Condensed step-by-step procedures for performing the most common task in the software as directed by the Owner and Engineer.
 - 3. Complete brochures, descriptive data and parts list, etc., on each piece of equipment, including all approved shop drawings.
 - 4. Complete maintenance and operating instructions, prepared by the manufacturer, on each major piece of equipment.
 - 5. Complete shop drawing submittal on temperature and monitoring controls including control diagrams updated to reflect "as-built" conditions.
 - 6. All wiring and component schematics necessary for Owner to troubleshoot, repair and expand the system.
- C. All brochures shall be submitted to the Architect prior to final inspection of the building.
- D. Provide one (1) framed sets of schematic drawings and sequence of operation to be hung at locations directed by the Engineer.

1.6 WARRANTY WORK:

- A. The Contractor shall be capable of responding to a warranty call within 24 hours of notification. The Contractor shall keep in stock material which routinely needs replacement or repairs.

1.7 DELIVERY, STORAGE AND HANDLING:

- A. Provide factory shipping cartons for each piece of equipment and control device. Provide factory applied plastic end caps on each length of pipe and tube. Maintain cartons and end caps through shipping, storage and handling as required to prevent equipment and pipe end damage, and to eliminate dirt and moisture from equipment. Store equipment and materials inside and protected from weather.

PART 2 - PRODUCTS

2.1 GENERAL MATERIALS AND EQUIPMENT REQUIREMENTS:

- A. General: Provide electric and DDC temperature control products in sizes and of capacities indicated, conforming to manufacturer's standard materials and components as published in their product information; designed and constructed as recommended by manufacturer, and as required for application indicated.
- B. The control equipment shall be complete and shall include, but not be limited to, all necessary valves, damper operators, pipe, fittings, etc.
- C. The direct digital system shall be complete and include, but not be limited to, all necessary sensors (analog and digital input), controllers (analog and digital output), system software, system hardware, remote panels, etc., to allow complete operation as specified.
- D. The control and monitoring system for this project shall be made up using standard materials, equipment and components regularly manufactured for systems of this type. The system shall be complete in every respect and shall be a functioning system.
- E. Electrical power wiring and interlock wiring for all controls, signal devices, alarms, etc., shall be in accordance with diagrams and instructions from the supplier of the systems. All wiring, conduit and wiring connections required for the complete installation shall be part of the work by the Contractor under this Section.
- F. As listed in the General Mechanical Conditions; all temperature control wiring to be in conduit.

2.2 SYSTEM REQUIREMENTS

- A. Contractor shall provide all equipment, engineering and factory trained technical specialist time to check the installation required for a complete and functioning system. The Contractor shall furnish and install all interconnecting system components. Components to include, but not be limited to: field panels, sensors, motor starter interfaces, and any other hardware items not mentioned above.

- B. Any feature or item necessary for complete operation, trouble-shooting, and maintenance of the system in accordance with the requirements of this specification shall be incorporated, even though that feature or item may not be specifically described herein.
- C. All materials and equipment used shall be by the same manufacturer and standard components, regularly manufactured for this and/or other systems and not custom designed especially for this project. All systems and components shall be thoroughly tested and proven in actual use.

2.3 GENERAL DESCRIPTION

- A. The Temperature Controls System shall be capable of integrating the required building functions including equipment supervision and control, alarm management, energy management, and information management. Temperature Controls System shall consist of a standalone DDC panel and any application specific controllers required.
- B. The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, Standalone DDC panels, and operator devices.
- C. Standalone DDC panels shall be able to access any data from, or send control commands and alarm reports directly to any other DDC panel or combination of panels on the network without dependence upon a central processing device, such as a central file server. Standalone DDC panels shall also be able to send alarm reports to operator workstations, terminals, and printers without dependence upon a central processing device or File Server.
- D. Each DDC panel shall operate independently by performing its own specified control, alarm management, and operator I/O. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.

2.4 NETWORKING/COMMUNICATIONS

- A. Inherent in the system's design shall be the ability to expand or modify the network either via a local area network, or auto-dial telephone line modem connections, or via a combination of the two networking schemes. All control systems and sub-systems shall be ASHRAE BACnet protocol compliant.
- B. Local Area Network
 - 1. Workstation/DDC Panel Support: DDC panels shall directly reside on a single shared high speed local area network such that communications may be executed directly between controllers, and between controllers and workstations on a peer-to-peer

basis.

C. Dynamic Data Access: All operator devices shall have the ability to access all point status and application report data, or execute control functions for any and all other devices via the local area network. Access to data shall be based upon logical identification of building equipment.

D. General Network Design: Network design shall include the following provisions:

- a. High speed data transfer rates for alarm reporting, quick report generation from multiple controllers, and upload/download efficiency between network devices.
- b. Support of any combination of controllers and operator workstations directly connected to the local area network.
- c. Detection and accommodation of single or multiple failures of either workstations, DDC panels or the network media. The network shall include provisions for automatically re-configuring itself to allow all operational equipment to perform their designated functions as effectively as possible in the event of single or multiple failures.
- d. Message and alarm buffering to prevent information from being lost.
- e. Error detection, correction, and re-transmission to guarantee data integrity.
- f. Default device definition to prevent loss of alarms or data, and ensure alarms are reported as quickly as possible in the event an operator device does not respond.
- g. Automatic synchronization of the real-time clocks in all DDC panels shall be provided.

2.5 STANDALONE DDC PANELS

A. General: Standalone DDC panels shall be microprocessor based, multi-tasking, multi-user, real-time digital control processors. Each standalone DDC panel shall consist of modular hardware with plug-in enclosed processors, communication controllers, power supplies, and input/output modules. A sufficient number of controllers shall be supplied to fully meet the requirements of this specification and the attached point list.

B. Memory: Each DDC panel shall have sufficient memory to support its own operating system and databases including:

1. Control processes
2. Energy Management Applications
3. Alarm Management

4. Historical/Trend Data for all points
5. Maintenance Support Applications
6. Operator I/O
7. Manual Override Monitoring

C. Point types: Each DDC panel shall support the following types of point inputs and outputs:

1. Digital Inputs for status/alarm contacts
2. Digital Outputs for on/off equipment control
3. Analog Inputs for temperature, pressure, humidity, flow, and position measurements
4. Analog Outputs for valve and damper position control, and capacity control of primary equipment

D. Expandability: The system shall be modular in nature, and shall permit easy expansion through the addition of software applications, workstation hardware, field controllers, sensors, and actuators.

E. Serial Communication Ports: Standalone DDC panels shall provide at least one RS-232C serial data communication ports for simultaneous operation of multiple operator I/O devices such as industry standard printers, laptop workstations, PC workstations, and panel mounted or portable DDC panel Operator's Terminals. Standalone DDC panels shall allow temporary use of portable devices without interrupting the normal operation of permanently connected modems, printers, or network terminals.

F. Integrated On-Line Diagnostics: Each DDC panel shall continuously perform self-diagnostics, communication diagnosis and diagnosis of subsidiary equipment. The DDC panel shall provide both local and remote annunciation of any detected component failures, or repeated failure to establish communication. Indication of the diagnostic results shall be provided at each DDC panel, and shall not require the connection of an operator I/O device.

G. Surge and Transient Protection: Isolation shall be provided at all network terminations, as well as all field point terminations to suppress induced voltage transients consistent with IEEE Standard 587-1980.

H. Powerfail Restart: In the event of the loss of normal power, there shall be an orderly shutdown of all standalone DDC panels to prevent the loss of database or operating system software. Non-Volatile memory shall be incorporated for all critical controller

configuration data, and battery back-up shall be provided to support the real-time clock and all volatile memory for a minimum of 72 hours.

- I. Upon restoration of normal power, the DDC panel shall automatically resume full operation without manual intervention.
- J. Should DDC panel memory be lost for any reason, the panel must be capable of receiving a download via the local area network, phone lines, or connected computer. In addition, the user shall have the capability of reloading the DDC panel via the local area network, via the local RS-232C port.

2.6 SYSTEM SOFTWARE FEATURES

A. General

- 1. All necessary software to form a complete operating system as described in this specification shall be provided.

B. Control Software Description:

- 1. Pre-Tested Control Algorithms: The DDC panels shall have the ability to perform the following pre-tested control algorithms:
 - a. Two Position Control
 - b. Proportional Control
 - c. Proportional plus Integral Control
 - d. Proportional, Integral, plus Derivative Control
- 2. Equipment Cycling Protection: Control software shall include a provision for limiting the number of times each piece of equipment may be cycled within any one-hour period.
- 3. Energy Management Applications: DDC Panels shall have the ability to perform any or all of the following energy management routines:
 - a. Time of Day Scheduling
 - b. Calendar Based Scheduling
 - c. Holiday Scheduling
 - d. Temporary Schedule Overrides
 - e. Night Setback Control
 - f. Supply Air Discharge Temperature Reset

g. Heating/Cooling Interlock

C. All programs shall be executed automatically without the need for operator intervention, and shall be flexible enough to allow operator customization. Programs shall be applied to building equipment as described in the Execution portion of this specification.

D. Process Inputs and Variables: It shall be possible to use any of the following in a custom process:

1. Any system-measured point data or status
2. User-Defined Constants
3. On-delay/Off-delay/One-shot timers

E. Process Triggers: Custom processes may be triggered based on any combination of the following:

1. Time interval
2. Time of day
3. Date
4. Other processes
5. Time programming
6. Events (e.g., point alarms)

F. Dynamic Data Access: A single process shall be able to incorporate measured or calculated data from any and all other DDC panels on the local area network.

1. In addition, a single process shall be able to issue commands to points in any and all other DDC panels on the local area network.

G. Advisory/Message Generation: Processes shall be able to generate operator messages and advisories to operator I/O devices. A process shall be able to directly send a message to a specified device, buffer the information in a follow-up file, or cause the execution of a dial-up connection to a remote device such as a printer.

1. Alarm Management: Alarm management shall be provided to monitor, buffer, and direct alarm reports to operator devices and memory files. Each DDC panel shall perform distributed, independent alarm analysis and filtering to minimize operator interruptions due to non-critical alarms, minimize network traffic, and prevent alarms from being lost. At no time shall the DDC panel's ability to report alarms be

affected by either operator activity at a PC Workstation or local I/O device, or communications with other panels on the network.

2. Point Change Report Description: All alarm or point change reports shall include the point's English language description, and the time and date of occurrence.
3. Prioritization: The user shall be able to define the specific system reaction for each point. Alarms shall be prioritized to minimize nuisance reporting and to speed operator response to critical alarms. Each DDC panel shall automatically inhibit the reporting of selected alarms during system shutdown and start-up. Users shall have the ability to manually inhibit alarm reporting for each point.
4. The user shall also be able to define under which conditions point changes need to be acknowledged by an operator, and/or sent to follow-up files for retrieval and analysis at a later date..

H. Transaction Logging: Operator commands and system events must be capable of being automatically logged to disk in Personal Computer industry standard database format. Operator commands initiated from Direct-connected workstations, dial-up workstations, and local DDC panel Network Terminal devices shall all be logged to this transaction file. This data shall be available at the Operator Workstation. A utility shall be provided to allow the user to search the transaction file using standard database query techniques, including searching by dates, operator name, data point name, etc. In addition, this transaction file shall be accessible with standard third party database and spreadsheet packages.

1. Historical Data and Trend Analysis: A variety of Historical data collection utilities shall be provided to automatically sample, store, and display system data in all of the following ways:
2. Continuous Point Histories: Standalone DDC panels shall store Point History Files for all analog and binary inputs and outputs.
3. The Point History routine shall continuously and automatically sample the value of all analog inputs at half hour intervals. Samples for all points shall be stored for the past 24 hours to allow the user to immediately analyze equipment performance and all problem-related events for the past day. Point History Files for binary input or output points and analog output points shall include a continuous record of the last ten status changes or commands for each point.
4. Extended Sample Period Trends: Measured and calculated analog and binary data shall also be assignable to user-definable trends for the purpose of collecting operator-specified performance data over extended periods of time. Sample intervals of 1 minute to 2 hours shall be provided. Each standalone DDC panel shall have a dedicated buffer for trend data.

5. Event Totalization: Standalone DDC panels shall have the ability to count events such as the number of times a pump or fan system is cycled on and off. Event totalization shall be performed on a daily, weekly, or monthly basis. The user shall have the ability to define a warning limit. Unique, user-specified messages shall be generated when the limit is reached.

2.7 HVAC DIGITAL CONTROLLERS

- A. Each Standalone DDC Controller shall be able to extend its performance and capacity through the use of remote Application Specific Controllers (ASCs).
- B. Each ASC shall operate as a standalone controller capable of performing its specified control responsibilities independently of other controllers in the network. Each ASC shall be a microprocessor-based, multi-tasking, real-time digital control processor.
- C. Each ASC shall have sufficient memory to support its own operating system and data bases including:
 1. Control Processes
 2. Energy Management Applications
- D. Operator I/O
 1. The operator interface to any ASC point data or programs shall be through any network-resident PC workstation, or any PC or portable operator's terminal connected to any DDC panel in the network.
 2. Application Specific Controllers shall directly support the use of a portable terminal. The capabilities of the portable terminal shall include but not be limited to the following:
 - a. Display temperatures
 - b. Display status
 - c. Display setpoints
 - d. Display control parameters
 - e. Override binary output control
 - f. Override analog setpoints
 - g. Modification of gain and offset constants

- E. Powerfail Protection: All system setpoints, proportional bands, control algorithms, and any other programmable parameters shall be stored such that a power failure of any duration does not necessitate reprogramming the controller.
- F. Configuration and Download: The ASCs shall have the capability of receiving configuration and program loading by both of the following: 1) locally, via a direct connect portable laptop service tool, 2) over the network, from the portable laptop service tool, and; 3) from an Operator Workstation, via the communication networks.
- G. Continuous Zone Temperature Histories: Application Specific Controllers shall have the capability to automatically and continuously maintain a history of the associated zone temperature to allow users to quickly analyze space comfort and equipment performance for the past 24 hours. A minimum of two samples per hour shall be stored.

2.8 MATERIALS AND EQUIPMENT:

- A. General: Provide control products in sizes and capacities indicated, consisting of valves, dampers, thermostats, sensors, controllers, and other components and required for complete installation. Except as otherwise indicated, provide manufacturer's standard materials and components as published in their product information; designed and constructed as recommended by manufacturer, and as required for application indicated. Provide control systems with the following functional and construction features.
- B. Relays And Switches
 - 1. Relays and switches shall be of the positive and gradual acting type and shall be furnished and installed as required for the successful operation of the system. All switches shall have suitable indicating plates.
 - 2. The Contractor shall provide all required relays, low-voltage transformers, terminal strips, enclosures, wiring, etc. to ensure that the required control sequences are maintained. Fully coordinate with the equipment manufacturer all control requirements that involves relays to the motor starters.
- C. Room Thermostat Covers for room thermostats in Public spaces shall be locking type. Provide clear plastic thermostat guards with locking device for all space thermostats in public spaces.
- D. Carbon Dioxide Sensors/Controllers: Provide carbon dioxide sensors/controllers as indicated. Sensors shall achieve sensing through photoacoustic technology or other prior approved means. Sensor shall be complete with sampling chambers, transducers, wall mounting bracket & enclosure. provide with binary or analog output as needed. When binary "on-off" operation is desired, then provide DPDT control relay with unit. Manufacturer: The Trane Company or equal. Sensors shall include a display of present carbon dioxide measurement.

- E. Water Flow Switches: Provide water flow switches of stainless steel paddle types. Provide pressure flow switches of bellows actuated mercury type of snap acting type, with appropriate scale range and differential adjustment for service indicated.
- F. Electronic Sensors used in air ducts or liquid lines shall utilize 1000 OHM non-adjustable Balco sensing elements, wound to plus or minus 1/10 of 1% accuracy. All sensors used in liquid line shall be provided with immersion wells. All sensors used in air stream, where the possibility of stratification exists, shall utilize 5' averaging elements. Solid State controllers shall be track-mounting type for panel mounting, fully modular, self contained, with all ratio, span and sequencing adjustments readily accessible. Controller shall accept single or multiple 0-1000 OHM or 1 to 15 VDC input signal and provide a proportional or two position output as required to perform the control sequence.
- G. Electronic Sensors used in liquid lines shall utilize 1000 OHM non-adjustable Balco sensing elements, wound to plus or minus 1/10 of 1% accuracy. All sensors used in liquid line shall be provided with immersion wells.
- H. Pressure Differential Switches: Provide pressure switches of bellows actuated mercury type or snap-acting type. Switches shall have appropriate scale ranges and differential adjustment for service indicated.
- I. Current Switches: Provide current sensing switches with adjustable current setpoints and form "C" contacts.
- J. Manual Operating Switches: In case of failure of the direct digital control system, provide override switches to operate fans, pumps, air handling units, etc., manually. Also, for control of temperatures and pressure sensors, provide pneumatic switches to allow supply temperatures and water temperatures and fans to be manually regulated.
- K. Miscellaneous: Furnish 2-position relays, capacity relays, sequencing relays, plus any other controls necessary to meet the specification and provide for a properly operating automatic control system. Relays shall be the enclosed plug-in type.
- L. Wells for Pipe Mounted Sensor: Wells for chilled water shall have minimum working pressure of 150 psig; wells for all other piping shall be 150 psig. Wells shall be brass or stainless steel; copper is not acceptable.
- M. Control Valves: Provide factory fabricated electronic control valves of type, body material and pressure class indicated. Where type or body material is not indicated, provide selection as determined by manufacturer for installation requirements and pressure class, based on maximum pressure and temperature in piping system. Except as otherwise indicated, provide valve size as required to maintain proper control. Submit sizing calculations and Cv selection criteria for review. Equip control valves over 1" in size with heavy duty actuators, with proper shutoff rating for each individual application. Maximum Cv for modulating valves shall be based upon 2.5 PSI maximum pressure drop unless otherwise indicated on the drawings.

N. Control Panelboards:

1. Panelboard shall contain all instruments and accessories. Each item of equipment shall be provided with an engraved nameplate. Panel shall be constructed of Formica with all edges trimmed in aluminum or shall be constructed of 18-gauge (minimum) baked enamel steel. Panelboard shall be wall-mounted or stand-mounted and shall be completely enclosed and shall have hinged doors complete with lock.
2. Provide all components in panelboards, including sensors, data boards, remote thermostat, etc.
3. As far as is practical, the control components for each system shall be grouped. Each group of components shall be provided with identification. Each component shall be further identified.
4. The entire panelboard shall be pre-wired and brought to a main terminal strip. All relays, switches, etc., shall be installed, furnished and wired on panelboard. Terminal strip shall be clearly marked so as to which wire from which component is to be connected.
5. Provide flow diagram of system and operating sequences on inside of door for each control panel.

O. Room Thermostats: Provide room electronic thermostats, fully proportional with adjustable throttling range and with adjustable setting and direct reading thermometer. Provide 7-day/24-hour programmable thermostats as indicated.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Examine areas and conditions under which control systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF AUTOMATIC TEMPERATURE CONTROLS:

- A. General: Install systems and materials in accordance with manufacturer's instructions, roughing-in drawings and details shown on the Drawings.

3.3 INSPECTION:

- A. Examine areas and conditions under which control systems are to be installed. Do

not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

- B. Control Wiring: Install control wiring, without splices between terminal points, color-coded. Install in neat workmanlike manner, securely fastened. Install in accordance with National Electrical Code. Install wiring in electrical conduit.
- C. Install circuits over 25-volt with colored coded wire. Wire gauge to be in accordance with National Electrical Code.
- D. Control wiring for analog functions shall be 18 AWG minimum with 600 volt insulation, twisted and shielded, 2 or 3 wire to match analog function hardware.
- E. Power Wiring: Obtain power for temperature controls.
 - 1. No more than 12 amps shall be put on one 20 amp circuit. No more than 3 circuits shall be run in one conduit.
- F. Sensor Wiring: Sensor wiring shall be 20 AWG minimum twisted and shielded, 2 or 3 wire to match analog function hardware.
- G. Software Programming: All software programs, including color graphic generation, shall be programmed by this Contractor.
- H. Supply Circuit Identification:
 - 1. Power feed locations for all controllers, DDC panels, etc. shall be indicated on the enclosures containing the device. Coordinate with electrical contractor and include Panel # and breaker.

3.4 FINAL ADJUSTMENT OF EQUIPMENT:

- A. After completion of installation, adjust control valves, motors and similar equipment provided as work of this section.
- B. Final adjustment shall be performed by specially trained personnel in direct employ of manufacturer of primary temperature control system. Coordinate services with Commissioning Authority.
- C. Instruct the Owner's representative in the operation and maintenance of all control systems and equipment.
- D. Final adjustment shall be performed by specially trained personnel in direct employ of manufacturer of primary temperature control system.
- E. Adjustment and Service:

1. After completion of the installation, the automatic temperature control manufacturer shall regulate and adjust all thermostats, control valves, motors, and other equipment provided under his contract and shall place them in complete operating condition, subject to approval by the Architect and Owner.

PART 4 - TEMPERATURE CONTROL SEQUENCES AND REQUIREMENTS

4.1 GENERAL

- A. Occupied and Unoccupied schedules for the various equipment and zones shall be determined by the Owner and programmed by the controls contractor.
- B. Ensure that the supply air smoke shut-down detectors properly operate to shutdown heat pump units.
- C. All points shall be monitored and controllable from the DDC system.

4.2 BOILER CONTROLS

- A. On a hydronic condenser water loop temperature drop to below 73 degrees F. (adj), the control panel shall enable operation of the boilers. Boiler controls shall be set for an operating limit of 130 degrees F. (adj.) with the boilers staging and modulating with their package boiler controls to heat condenser water to a 70 degree F. (adj.) supply water temperature in the condenser water main.
- B. Pumps P-2A and P-2B shall be interlocked with their respective boiler controls to operate whenever the respective boiler is demanded to operate.
- C. Boiler operation shall be "locked out" at hydronic heat pump loop temperature of 80°F and greater.
- D. The control contractor is to provide boiler emergency shut-off switches located as shown on the plans and in accordance with Paragraph HG-635, Article 6, Section 4 of the ASME Heating Boiler Code. Provide with cover and label "Boiler Emergency Shut Down". The activation of these switches shall open all electrical contactors to the boilers' operation.

4.3 HYDRONIC HEAT PUMP SYSTEM CONTROL AND ALARM

- A. The contractor shall furnish and install solid state DDC controls to perform the following functions:
- B. Control the rejection of surplus heat from the heat pump water loop upon temperature

rise to the selected control point. Control operation of the cooling tower pump, discharge dampers, and blower speed.

1. Monitor the flow of water in the loop and its temperature.
 2. Control the operation of the condenser water loop primary and stand-by circulating pumps.
 3. Control the operation of the cooling tower
 4. Sound alarm and indicate fault in the event of loss of water flow or water temperatures above or below the maximum of minimum control safe limits in either cooling tower or condenser water loops.
 5. Absolutely prohibit simultaneous operation of supplementary heating and heat rejection functions.
 6. Control addition of supplemental heat.
- C. Controls shall be complete and shall include electronic temperature sensors for the water loops (in wells) and for outdoor air temperature (in weatherproof enclosure), plug-in relays, indicator lights, alarm horn, and terminal blocks for all field wiring connections. The power supply to the panel shall be 120 volts, single phase transformer for operation at other voltages and frequencies.
- D. The DDC control system shall monitor temperature for condenser water loop, tower water loop and outdoor air temperatures.
- E. Contractor shall install the temperature sensor wells, the flow switch and thermometer wells in the water loop lines as shown on the plans, before filling the system. Contractor shall furnish and install field wiring and conduit from panel controlled motor starters, supplementary heater control to boilers and flow switch.
- F. The automatic pump operation of pumps P-1A and P-1B shall be as follows:
- a) Flow shall be proven by current sensor or flow switch when a pump is required to start. This flow condition is to be monitored by DDC system. If flow fails to prove after suitable time period (15 seconds adj.), then the controls shall alternate to the stand-by pump, and repeat sequence to prove flow. Pump failures shall be indicated as a visual alarm. Failure of both pumps shall activate audible alarm.
 - b) The lead pump is to be capable of being selected manually or automatically rotate once a month.
 - c) All pumps are to be provided with Hand-Auto-Off selector controls and

relays.

d) If flow is not proven from either pump in the allotted time, all boilers are to disengage. Relays shall also be provided to de-energize energy recovery unit ERU-1.

e) When flow has been restored, normal functions of the boilers and energy recovery unit shall be restored.

G. Pumps P-1A and P-1B shall also be controlled by variable frequency control drives that will adjust speed of pump rotation base upon a static water pressure signal located on the condenser water supply line. The pump discharge setpoint shall be set with all system valves open and balanced to the rated flow of the furthest heat pump, with the water fill PRV set as required, and with the subsequent balance of the pump triple duty valve. VFD shall not operate less than 14 Hz.

H. Hydronic water from either Pump P-1A or P-1B shall be normally continuous, 24 hours/day.

4.4 HEAT REJECTION CONTROL

A. The heat rejection control sequencing controls shall engage control of the cooling tower pump, blower and discharge dampers as indicated below:

B. The heat rejection sequence of operation shall be as follows:

1. Stage 1: On a condenser loop temperature rise to 80°F (adj), controls shall engage the cooling tower water pump ON, and the discharge hood dampers shall OPEN.
2. Stage 2: On a condenser loop temperature rise to 83°F (adj), control shall close starter circuit to tower LOW fan speed.
3. Stage 3: On a rise to 85°F (adj), control shall close starter circuit to close starter circuit to tower HIGH fan speed, and shall be monitored by DDC controls.
4. On a temperature drop to 2 degrees below the closure point, each stage shall be de-energized in reverse order.

4.5 SYSTEM SAFETY CONTROL AND ALARM FUNCTIONS

A. The sequence and operation of the safety control functions shall be as follows:

B. The operation of the alarm functions shall be as follows:

C. The alarm shall sound and a red light be illuminated as follows:

1. In the event of loss of condenser water flow,
 2. In the event of high condenser water temperature (103 degrees F., adj.)
 3. In the event of low condenser water loop temperature (57 degrees F., adj.).
- D. The alarm is to automatically silence upon return to normal temperatures.
- E. The alarm shall sound continuously until manually silenced until a return to temperatures occurs, except when loss of flow results in pump sequencing, the alarm shall automatically silence when flow is re-established.
- F. A manual alarm silence switch shall be provided.
- G. The alarms shall also be annunciated at the DDC control software. Contractor shall provide provisions in the software to send messaging to Library identified parties alarming system conditions.

4.6 ADDITIONAL TOWER CONTROLS

- A. The sump basin electric heaters shall be controlled to maintain basin water temperature at 38°F (adj.). Provide water temperature sensor and wire all other required controls.
- B. Make-up water shall be called for by a mechanical float device in tower basin.

4.7 HEAT PUMP TERMINAL UNIT CONTROL

- A. Basic controls for the heat pump shall include relays to control compressor and fan operation. A lockout relay shall stop compressor operation upon low suction temperature or refrigerant high pressure abnormalities.
- B. Programmable Automatic Change-Over Thermostats
1. Programmable Auto-changeover thermostats shall be provided for each HP heat pump unit. Thermostats shall be programmable with 24-hour/7 day programming capabilities, and provided with heat-cool-off switch and auto/on fan control. Thermostat shall have seven day programming capabilities for night setback with over-ride capability, or such ability is to be provided by the DDC control system. Setback capability shall not be set to deviate room temperatures beyond 8 degrees F. from normal setpoint. Thermostats to be BACnet compliant.
- C. All new horizontal heat pump units are to be provided with a two-way, two-position control valve. When the heat pump either is called to provide heating or cooling, the valve shall open. When the unit thermostat is satisfied, the valve is to close. Heat pump HP-20 is not to be provided with a closure valve.
- D. Provided a clear lexan plastic temper-proof cover in all areas where heat pump thermostats are indicated in public spaces, auditorium, classroom areas, common areas,

lecture spaces and public spaces.

- E. Note that ALL horizontal heat pump units are to be provided with condensate overflow switches located in the overflow connection of the chassis. Upon sensing an overflow condition the respective heat pump unit is to dis-engage and the DDC control panel shall signal an alarm for maintenance. Once the overflow condition has been remedied, the unit is to automatically resume normal functions.

4.8 COOLING TOWER CHEMICAL SYSTEM CONTROLS

- A. Controls shall be supplied by the chemical system supplier.
- B. As water evaporates in the tower, minerals are left behind. These minerals increase the electrical conductivity of the water. The controller senses this conductivity increase and opens the bleed of the indoor tower water valve. The controller senses this dilution and closes the bleed valve. As water leaves the system through evaporation and periodic bleed, new make-up water is brought in, diluting the solids content. At a proportional rate, new water enters the system, and the chemical feed pump is energized to inject chemical treatment to this water.

4.9 ENERGY RECOVERY UNITS (ERV-1)

- A. Energy recovery units ERV-1 is to operate based upon building occupancy schedule. When building is “occupied”, then unit supply and exhaust fans shall operate continuously. Energy recovery units to have winter control operation to engage timed exhaust defrost once outside air drops to a threshold of concern. When unit is in “unoccupied”, the unit fans are to stage off.

4.10 ECONOMIZER CONTROLS FOR HP-20

- A. Provide unit controller to control the vertical heat pump economizer dampers in a stand-alone mode, but integrated into the programmable thermostat. This control sequence can be accomplished by DDC controls package with central system, or can be standalone equal to Honeywell Jade W7220 controller with C7400 enthalpy sensors.
- B. The HVAC system shall perform the following control strategies:
 - 1. Unoccupied Mode - When the central control system initiates the Unoccupied mode, the mixing box dampers shall assume the unoccupied cooling setpoints. If the unoccupied setpoints are exceeded, the unit shall cool until the zone temperature is within the unoccupied setpoints. The outdoor air damper shall remain closed for night setback operation (unless economizing for zone cooling). The fan shall operate in the automatic control mode.
 - 2. Occupied Operation - When the unit is controlled to the Occupied mode, all unit functions shall be enabled. Outside air damper to open to minimum position of

500 CFM as determined by test and balance. Outside air and return air dampers shall be balanced to intake 1750 CFM (adj.) of outside air at a separate damper position when carbon dioxide sensor detects indoor carbon dioxide levels in excess of 900 PPM (adj.). When carbon dioxide levels are less than this amount, the damper positions to return to reset minimum position of 500 CFM for outside air. Locate carbon dioxide sensor in Auditorium as indicated on Drawings.

3. Cooling/Economizer - During the Occupied cooling mode of operation the economizer, if available, and mechanical cooling are used to control the supply air temperature. If the enthalpy of the outdoor air is appropriate to use free cooling the economizer shall be used to satisfy the supply air setpoint. If more cooling is then required, compressors shall be staged on as necessary. At outdoor air conditions above the control setting, mechanical cooling only shall be used and the fresh air dampers shall remain at minimum position. As the supply fan modulates down, the minimum economizer position shall also be reset to compensate for the reduction in total airflow.

4.11 DOMESTIC HOT WATER RECIRCULATION PUMP

- A. Provide timer and relay to circulate existing domestic hot water recirculation pump for 5 minutes (adj.) every elapsed time period of 30 minutes (adj.).

4.12 MAU-1 CCONTROLS

- A. Units MAU-1 to be interlocked with the operation of the paint hood. Contractor to provide a relay box and provide current sensor to detect when the paint hood fan operates. When hood fan is energized, then the MAU-1 fan to be energized. Temperature controls on the MAU-1 unit are to modulate gas burner to provide 65 deg.F. minimum leaving air temperature.

4.13 BARN EXHAUST FAN

- A. Fan EF-2 to be wired to a manual switch on the wall and interlocked with the intake wall louver to open when fan is manually engaged.

4.14 DUCT SMOKE DETECTORS

- A. Duct smoke detectors shall shut down their respective heat pump unit as per NFPA 90A.

END OF SECTION 230900

SECTION 232113 - HVAC CONDENSER & HOT WATER PIPING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions, apply to work of this section.

1.2 DESCRIPTION OF WORK:

- A. Extent of HVAC water piping systems work is indicated on drawings and schedules, and by requirements of this section.
- B. Refer to section "Testing, Adjusting, and Balancing" for chilled/condenser water system balancing; not work of this section.

1.3 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacturer of piping products of types, materials and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: A firm with at least 3 years of successful installation experience on projects with piping system work similar to that required for project.
- C. ANSI Compliance: Comply with applicable American National Standards pertaining to products and installation of chilled/condenser and hot water piping systems.

1.4 SUBMITTALS:

- A. Product Data: Submit manufacturer's data for piping systems materials and products.

PART 2 - PRODUCTS

2.1 HVAC CONDENSER AND HOT WATER PIPING MATERIALS AND PRODUCTS:

- A. General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with ANSI B31.1 Code for Power Piping where applicable, base pressure rating on water piping systems maximum design pressures. Provide sizes and types matching piping and equipment connections, provide fittings of materials which match pipe materials used in chilled/condenser and hot water piping systems. Where more than one type of materials or products are indicated, selection is Installer's option.

2.2 BASIC IDENTIFICATION:

- A. General: Provide identification complying with Division 15 Basic Materials and Methods section "Mechanical Identification", in accordance with the following listing:
 - 1. Condenser Water Valves: Plastic valve tags.
 - 2. Hot Water Piping: Brass valve tags.

2.3 BASIC PIPE, TUBE AND FITTINGS:

- A. General: Provide pipe, tube, and fittings in accordance with the following listing:
 - 1. Condenser Water Piping:
 - a. Pipe Size 2" and Smaller: Black steel pipe.
 - 1) Pipe Weight: Schedule 40.
 - 2) Fittings: Class 125 cast iron threaded.
 - b. Tube Size 3" and Smaller: Copper tube.
 - 1) Wall Thickness: Type L.
 - 2) Fittings: Wrought steel solder-joints; with appropriate di-electric unions/fittings at connection to ferrous piping.
 - c. Pipe Size 2½" and Larger: Black steel pipe.
 - 1) Pipe Weight: Schedule 40.
 - 2) Fittings: Wrought-steel butt welding.
 - a) or
 - 3) Fittings: Mechanical grooved couplings. NOTE: Mechanical grooved piping shall only be an acceptable option so long as the Contractor provides the boiler with a temperature control high limit of 200 degrees F. maximum as required by the Kentucky boiler code. This control shall be White Rodgers or prior approved equal. Fittings & couplings must have been tested and listed by a nationally recognized testing laboratory.
 - 2. Hot Water Piping:
 - a. Pipe Size 2" and Smaller: Black steel pipe.

- 1) Pipe Weight: Schedule 40.
- 2) Fittings: Class 125 cast iron threaded.
- b. Tube Size 3" and Smaller: Copper tube.
 - 1) Wall Thickness: Type L.
 - 2) Fittings: Wrought steel solder-joints.
- c. Pipe Size 2½" and Larger: Black steel pipe.
 - 1) Pipe Weight: Schedule 40.
 - 2) Fittings: Wrought-steel butt welding.

2.4 BASIC PIPING SPECIALTIES:

- A. General: Provide piping specialties complying with Division 15 Basic Materials and Methods section "Piping Specialties", in accordance with the following listing:
 1. Dielectric unions.

2.5 BASIC SUPPORTS, ANCHORS, AND SEALS:

- A. General: Provide supports, anchors and seals complying with Division 15 "Supports, Anchors, and Seals", in accordance with the following listing:
- B. Adjustable steel clevises, adjustable pipe saddle supports, single pipe rolls, and adjustable roller hangers, for horizontal piping hangers and supports.
- C. Two-bolt riser clamps, for vertical piping clamps.
- D. Steel turnbuckles, for hanger rod attachments.
- E. Concrete inserts, C-clamps, malleable beam clamps and steel brackets for building attachments.
- F. Protection saddles, for saddles and shields.

PART 3 - EXECUTION

3.1 INSTALLATION OF BASIC IDENTIFICATION:

- A. General: Install mechanical identification in accordance with Division 15 Basic Materials and Methods Section "Mechanical Identification".

3.2 INSTALLATION OF CONDENSER AND HOT WATER DISTRIBUTION PIPING:

- A. General: Install pipe, tube and fittings in accordance with recognized industry practices which will achieve permanently-leakproof piping systems, capable of performing each indicated service without piping failure. Install each run with minimum joints and couplings, but with adequate and accessible unions for disassembly and maintenance/replacement of valves and equipment. Reduce sizes (where indicated) by use of reducing fittings. Align piping accurately at connection, within 1/16" misalignment tolerance.
- B. Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details and notations or, if not otherwise indicated, run piping in shortest route which does not obstruct usable space or block access for servicing building and its equipment.
- C. Electrical Equipment Spaces: Do not run piping through transformer vaults and above panels, starters, distribution sections, etc.. and other electrical or electronic equipment spaces and enclosures.
- D. Thread pipe in accordance with ANSI B2.1; cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound, or pipe joint tape (Teflon) where recommended by pipe/fitting manufacturer, on male threads at each joint and tighten joint to leave not more than three threads exposed.
- E. Solder copper tube-and-fitting joints where indicated, in accordance with recognized industry practice. Cut tube ends squarely, ream to full inside diameter, and clean outside of tube ends and inside of fittings. Apply solder flux to joint areas of both tubes and fittings. Insert tube full depth into fitting, and solder in manner which will draw solder full depth and circumference of joint. Wipe excess solder from joint before it hardens.
- F. Weld pipe joints in accordance with ANSI B31.
- G. Weld pipe joints in accordance with recognized industry practice and as follows:
- H. Bevel pipe ends at a 37.5° angle where possible, smooth rough cuts, and clean to remove slag, metal particles and dirt.
- I. Install welding rings for butt welded joints.
- J. Use pipe clamps or tack-weld joints with 1" long welds; 4 welds for pipe sizes to 10", 8 welds for pipe sizes 12" to 20".

- K. Build up welds with stringer-bead pass, followed by hot pass, followed by cover or filler pass. Eliminate valleys at center and edges of each weld. Weld by procedures which will ensure elimination of unsound or unfused metal, cracks, oxidation, blow-holes and non-metallic inclusions.
- L. Do not weld-out piping system imperfections by tack-welding procedures; refabricate to comply with requirements.
- M. Flanged Joints: Match flanges within piping system, and at connections with valves and equipment. Clean flange faces and install gaskets. Tighten bolts to provide uniform compression of gaskets.
- N. Grooved Pipe Joints: Comply with fitting manufacturer's instructions for making grooves in pipe ends. Remove burrs and ream pipe ends. Assemble joints in accordance with manufacturer's instructions.
- O. Install eccentric reducers where pipe is reduced in size in direction of flow, with tops of both pipes and reducer flush.
- P. Install piping level with no pitch.
- Q. Connect branch feed piping to mains at horizontal center line of mains, connect run out piping to branches at horizontal center line of branches.
- R. Locate groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.

3.3 EQUIPMENT CONNECTIONS:

- A. General: Connect water piping system to mechanical equipment as indicated, and comply with equipment manufacturer's instructions where not otherwise indicated. Install shutoff valve and union on supply and return, drain valve on drain connection.

3.4 CLEANING AND FLUSHING HYDRONIC PIPING

- A. All water circulating systems for the project shall be thoroughly cleaned before placing in operation to rid the system of dirt, piping compound, mill scale oil and any and all other material foreign to the water.
- B. During construction, extreme care shall be exercised to prevent all dirt and other foreign matter from entering the pipe or other parts of the system. Pipe stored on the project shall have the open ends capped and equipment shall have all openings fully protected. Before erection, each piece of pipe, fitting or valve shall be visually examined and all dirt removed.
- C. After system is complete, the Contractor shall first fill the piping loop and all runouts

with clear water. For this purpose, the supply and return runouts shall be temporarily connected together at each heat pump location. There shall be no water flow through the heat pumps. The loop water shall be circulated for one hour with make-up water open and boiler drain open to accomplish initial flushing of the system.

- D. After initial flush, the individual heat pumps shall be connected permanently to the supply and return runouts and the system filled for operation under the normal closed loop conditions. The sub-contractor shall add trisodium phosphate in an aqueous solution to the system at the proportion of one pound per fifty gallons of water in the system. After the system is filled with this solution, the system water shall be brought up to 95°F temperature and allowed to circulate for two hours. The engineer shall be given notice by the Contractor of scheduling this cleaning operation and will be present to observe the cleaning operation and, if the Mechanical Engineers representative deems it necessary, the operation shall be repeated.
- E. After the system has been completely cleaned as specified herein, it shall be tested by litmus paper or other dependable method and shall be left on the slightly alkaline side (PH=7.5+-). If the system is found to be still on the acid side, the cleaning by the use of Trisodium Phosphate shall be repeated.
- F. The Contractor shall not add any water treatment chemicals or stop-leak compounds to the system at any time.

3.5 CHEMICAL TREATMENT (HEAT PUMP LOOP)

A. QUALIFICATIONS

- 1. Chemicals, service and equipment shall be supplied by a single water treatment company for undivided responsibility, the water treatment chemical and service supplier shall be a recognized specialist, active in the field of industrial water treatment for at least 10 years, whose major business is in the field water treatment. The water treatment company shall have regional water analysis laboratories, development facilities and service department, full time personnel located with the trading area of the job site, such as American Water Treatment, Inc., Kesco, Mongul, Deadborn or Betz.

B. CLOSED LOOP RECIRCULATING SYSTEM

1. EQUIPMENT

- a. Provide one 5 gallon bypass chemical feeder for the system.

2. CHEMICAL

- a. Furnish one year's supply of closed system corrosion inhibitor of the non-

chromate type. Include an oxygen scavenger.

3.6 COOLING TOWER CHEMICAL SYSTEM

- A. Chemicals, service and equipment shall be supplied by a single water treatment company for undivided responsibility, the water treatment chemical and service supplier shall be a recognized specialist, active in the field of industrial water treatment for at least 10 years, whose major business is in the field water treatment. The water treatment company shall have regional water analysis laboratories, development facilities and service department, full time personnel located with the trading are of the job site, such as American Water Treatment, Inc., Kesco, Mongul, Deadborn or Betz.
- B. Controls shall be supplied by the chemical system supplier.
- C. Chemical additives to include a biocide, scale inhibitor, and corrosion inhibitor compatible with the galvanized tower.
- D. As water evaporates in the tower, minerals are left behind. These minerals increase the electrical conductivity of the water. The controller senses this conductivity increase and opens the bleed of the indoor tower water valve. The controller senses this dilution and closes the bleed valve. As water leaves the system through evaporation and periodic bleed, new make-up water is brought in, diluting the solids content. At a proportional rate, new water enters the system, and the chemical feed pump is energized to inject chemical treatment to this water.

3.7 LEAK TESTING:

- A. General: Provide temporary equipment for testing, including pump and gages. Test piping system before insulation is installed, wherever feasible, and remove control devices before testing. Subject entire steam supply and return piping systems to leak tests, either as a whole, or in sections; but leave no part untested.
- B. Fill piping systems with clear water, vent all air, and pressurize at 150% of operating pressure, (but not less than 25 PSI) for 2 hours. Test fails if leakage is observed or pressure drop exceeds 5% of test pressure.
- C. Repair piping systems which fail required piping test, by disassembly and re-installation, using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics or other temporary repair methods.
- D. Drain test water from piping systems after testing and repair work has been completed.

END OF SECTION 232113

SECTION 232116 - HYDRONIC SPECIALTIES

PART 1 - GENERAL

1.1 QUALITY ASSURANCE:

A. Manufacturers: Firms regularly engaged in manufacturer of hydronic specialties of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. ASTM Code: Comply with all ASTM Codes pertaining to valves and tanks.

PART 2 - PRODUCTS

2.1 MANUFACTURED HYDRONIC SPECIALTIES:

A. General: Provide factory-fabricated hydronic specialties recommended by manufacturer for use in service indicated. Provide hydronic specialties of types, capacities, and pressure ratings indicated for each service, or if not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes as indicated, and connections, which properly mate with pipe, tube, and equipment connections, where more than one type cannot be used on the project.

B. Balance Valves:

1. General: Provide balance valves as indicated, of one of the following types:

2. Soldered Ends 2" and Smaller: Class 125, bronze body, globe type with memory stop, straight or angle pattern.

3. Threaded Ends 2" and Smaller: Class 125, bronze body, ball type with memory stop, straight or angle pattern.

4. Available Manufacturers: Subject to compliance with requirements, manufacturers offering balance valves which may be incorporated in the work include, but are not limited to the following:

- a. Bell & Gossett, ITT Fluid Handling Div.
- b. Hammond Valve Corp., Div. of Conval Corp.
- c. Illinois Products, American Air Filter Co., Inc.
- d. Milwaukee Valve Co., Inc.
- e. Sarco Co., Div. of White Consolidated.
- f. Taco, Inc.

C. Vent Valves:

1. Manual Vent Valves: Provide manual vent valves designed to be operated manually with screwdriver or thumbscrew, 1/8" N.P.T. connection.
2. Automatic Vent Valves: Provide automatic vent valves designed to vent automatically with float principle, stainless steel float and mechanisms, cast-iron body, pressure rated for 125 PSI, 1/2" N.P.T. inlet and outlet connections.
3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering vent valves which may be incorporated in the work include, but are not limited to the following:
 - a. Armstrong Machine Works.
 - b. Bell & Gossett, ITT Fluid Handling Div.
 - c. Hoffman Specialty, ITT Fluid Handling Div.
 - d. Sarco Co., Div. of White Consolidated.

D. Air Separators:

1. General: Provide air separators pressure rated for 125 PSI. Select capacity based on total system GPM; and not to exceed 2.5 PSI pressure loss.
2. Combination Separator/Strainer: Provide external combination air separators/strainers as indicated. Construct of steel complying with ASME Boiler and Pressure Vessel Code and stamped with "U" symbol. Furnish National Board Form U-1 denoting compliance. Provide galvanized steel integral strainer with 3/16" perforations and free area of not less than 5 times cross-sectional area of connecting lines. Provide tangential inlet and outlet connections and internal stainless steel air collector tube designed to direct released air into compression tank. Provide blowdown connections.
3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering air separators which may be incorporated in the work include, but are not limited to the following:
 - a. Armstrong Pumps, Inc.
 - b. Bell & Gossett, ITT Fluid Handling Div.
 - c. Taco, Inc.
 - d. Thrush Div., Amtrol, Inc.

E. Diaphragm-Type Compression Tanks:

1. General: Provide diaphragm compression tanks of size and number as indicated. Construct tank of welded steel, constructed, tested, and stamped in accordance with Section VII of the ASME Boiler and Pressure Vessel Code for a working pressure of 125 PSI. Furnish National Board Form U-1 denoting compliance. Support vertical tanks with steel legs or base; support horizontal tanks with steel saddles. Provide specially compounded flexible diaphragm securely sealed into tank to permanently separate air charge from system water to maintain design expansion capacity. Provide pressure gage and air charging fitting.

2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering diaphragm type compression tanks which may be incorporated in the work include, but are not limited to the following:

- a. Amtrol, Inc.
- b. Bell & Gossett

F. Pump Suction Diffusers:

1. General: Provide pump suction diffusers as indicated. Construct unit with angle pattern cast iron body, threaded for 2" and smaller, flanged for 2½" and larger, pressure rated for 175 PSI. Provide inlet vanes with length 2½ times pump suction diameter or greater. Provide cylinder strainer with 3/16" diameter openings with total free area equal to or greater than 5 times cross sectional area of pump suction, designed to withstand pressure differential equal to pump shutoff head. Provide disposable fine mesh strainer to fit over cylinder strainer. Provide permanent magnet located in flow stream, removable for cleaning. Provide adjustable foot support designed to carry weight of suction piping. Provide blowdown tapping in bottom, gage tapping in side.

2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering pump suction diffusers which may be incorporated in the work include, but are not limited to the following:

- a. Armstrong Pumps, Inc.
- b. Bell & Gossett, ITT Fluid Handling Div.
- c. Taco, Inc.
- d. Thrush Div., Amtrol, Inc.
- e. Victaulic Co. of America

G. Pump Triple Duty Valves:

1. General: Provide pump discharge valves as indicated. Provide non-slam check valve with spring loaded disc and calibrated adjustment feature permitting regulation of pump discharge flow and shutoff. Design valves to permit repacking under full line pressure, and with bolt-on bonnet. Provide flanged cast iron valve body, pressure rated for 175 PSI, maximum operated temperature of 300°F. Provide straight or angle pattern as indicated.

2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering pump suction diffusers which may be incorporated in the work include, but are not limited to the following:

- a. Armstrong Pumps, Inc.
- b. Bell & Gossett, ITT Fluid Handling Div.
- c. Taco, Inc.
- d. Thrush Div., Amtrol, Inc.

H. Centrifugal Solids Filter ("System Saver"):

1. General: Provide centrifugal solids filter as indicated constructed of steel construction. Solids filter shall filter water solids by centrifugal force into a separation chamber upon which the solids are deposited into a collection chamber. Size of solids filter shall be line sized as indicated on the drawings. Filter shall come with blowdown from the collection chamber for periodic purge.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering shot feeders which may be incorporated in the work include, but are not limited to the following:
 - a. Snyder General Corporation, McQuay
 - b. The Trane Company
 - c. Bell & Gossett, ITT Fluid Handling Div.

I. Shot Feeders:

1. General: Provide shot feeders of 5 gal. capacity or otherwise as indicated, constructed of cast iron or steel, for introducing chemicals/antifreeze into hydronic system. Provide funnel and valve on top for loading, drain valve in bottom, and recirculating valves on side. Construct for pressure rating of 125 PSI.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering shot feeders which may be incorporated in the work include, but are not limited to the following:
 - a. Culligan USA.
 - b. Vulcan Laboratories, Subsidiary of Clow Corp.

J. Liquid Flow Switches:

1. General: Provide liquid flow switches as indicated to sense flow and non-flow. Construct of brass for all wetted parts, provide packless construction. Provide paddle with removable segments for pipe size and flow velocity. Provide vapor proof electrical compartment for switches mounted on cold piping hydronic systems. Furnish switches for 115 volt, 60 cycle, single phase with 7.4 amp. rating; or otherwise as indicated.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering flow switches which may be incorporated in the work include, but are not limited to the following:
 - a. McDonald & Miller, ITT Fluid Handling Div.

K. Pressure Reducing Valves:

1. General: Provide pressure reducing valves as indicated, of size and capacity as selected by

Installer to maintain operating pressure on HVAC boiler system.

2. Construction: Cast iron or brass body, low inlet pressure check valve, inlet strainer removable without system shut-down, non-corrosive valve seat and stem, factory set at operating pressure.

3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering pressure reducing valves which may be incorporated in the work include, but are not limited to the following:

- a. Amtrol, Inc.
- b. Armstrong Pumps, Inc.
- c. Bell & Gossett, ITT Fluid Handling Div.
- d. Taco, Inc.

PART 3 - EXECUTION

3.1 INSTALLATION OF MANUFACTURED HYDRONIC SPECIALTIES:

A. Vent Valves:

B. Manual Vent Valves: Install manual vent valves on each hydronic terminal at highest point, and on each hydronic piping drop in direction of flow for mains, branches and runouts, and elsewhere as indicated.

C. Automatic Vent Valves: Install automatic vent valves at top of each hydronic riser and elsewhere as indicated. Install shutoff valve between riser and vent valve, pipe outlet to suitable plumbing drain, or as indicated.

D. Air Separators:

1. Combination Separator/Strainer: Install external combination separators/strainers in pump suction lines. Connect inlet and outlet piping. Run piping to compression tank pitched towards tank at 1" rise in 5' run (1.7%). Install blowdown valve and piping. Remove and clean strainer after 24 hours and again after 30 days of system operation.

E. Diaphragm-Type Compression Tanks:

1. General: Install diaphragm-type compression tanks on floor as indicated, in accordance with manufacturer's instructions. Vent and purge air from hydronic system, charge tank with proper air charge as recommended by manufacturer.

F. Pump Suction Diffusers:

1. General: Install on pump suction inlet, adjust foot support to carry weight of suction piping.

Install nipple and shutoff valve in blowdown connection. After cleaning and flushing hydronic piping system, but before balancing of hydronic piping system, remove disposable fine mesh strainer.

G. Pump Triple Duty Valves:

1. General: Install in horizontal or vertical position with stem in upward position; allow clearance above stem for check mechanism removal. After hydronic system has been completed, mark calibrated name plate with stripe of yellow lacquer to permanently mark final balanced position.

H. Centrifugal Solids Filter:

1. General: Install in vertical position with blowdown at the bottom position; allow clearance for blowdown valve & bucket below valve. provide isolation valves upstream and downstream of filter; also provide a bypass valve in the system main to induce a pressure drop to force water through filter. One of the filter isolation valves shall be a balancing port type, located on the return line to the main. During start-up of system, periodically purge separator of solids.

I. Shot Feeders:

1. General: Install shot feeders on each hydronic system at pump discharge and elsewhere as indicated. Install in upright position with top of funnel not more than 48" above floor. Install globe valve in pump discharge line between recirculating lines. Pipe drain to nearest plumbing drain or as indicated.

J. Liquid Flow Switches:

1. General: Install liquid flow switches on hydronic loop system and elsewhere as indicated. Install in horizontal pipe with switch mounted in tee on top of pipe with minimum of 24" of straight pipe with no fittings both upstream and downstream of switch. Remove segments of paddle to fit pipe in accordance with manufacturer's instructions.

K. Pressure Reducing Valves:

1. General: Install for each separated water system as indicated, and in accordance with manufacturer's installation instructions.

END OF SECTION 15710

SECTION 232123 - PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contractor, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- B. This section is a Division 15 Basic Materials and methods section and is a part of each Division 15 section making reference to pumps specified herein.

1.2 DESCRIPTION OF WORK:

- A. Extent of pumps required by this section is indicated on drawings and/or specified in other Division 15 sections.
- B. Types of pumps specified in this section include the following:
 - 1. Frame-Mounted End Suction.
 - 2. In-Line Pumps
 - 3. Pump Variable Frequency Drives
- C. Refer to appropriate Division 15 sections for vibration isolation bases and flexible pipe connectors for pumps; not work of this section.

1.3 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacturer of general use centrifugal pumps with characteristics, sizes and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. UL and NEMA Compliance: Provide electric motors and products which have been listed and labeled by Underwriters Laboratories and comply with NEMA standards. Motors shall be high efficiency type.

1.4 SUBMITTALS:

- A. Product Data: Submit manufacturer's pump specifications, Installation and start-up instructions, and current accurate pump characteristic performance curves with selection points clearly indicated.
- B. Maintenance Data: Submit maintenance data and spare parts lists for each type of pump. Include this data in maintenance manual.

PART 2 - PRODUCTS

2.1 PUMPS:

- A. General: Provide factory tested pumps, thoroughly cleaned and painted with one coat of machinery enamel prior to shipment. Type, size and capacity of each pump is listed in pump schedule. provide pumps of same type by same manufacturer.

2.2 FRAME-MOUNTED END SUCTION PUMPS:

- A. General: Provide frame mounted end suction pumps where indicated, and of capacities and having characteristics as scheduled.
- B. Type: Horizontal mount, single stage, vertical split case, flexible coupling, base mounted, designed for 175 PSI working pressure.
- C. Casing: Cast iron, 125 PSI ANSI flanges, tappings for gage and drain connections.
- D. Shaft: Steel with replaceable shaft sleeve.
- E. Bearings: Regreasable ball bearings.
- F. Seal: Mechanical, with carbon seal ring and ceramic seat.
- G. Motor: Open, drip-proof, regreasable ball bearings, energy efficient.
- H. Impeller: Enclosed type, hydraulically and dynamically balanced, keyed to shaft and secured with locking screw.
- I. Baseplate: Structural steel with welded cross members and open grouting area.
- J. Coupling: Flexible, capable of absorbing torsional vibration, equipped with coupling guard.
- K. Available Manufacturers: Subject to compliance with requirements, manufacturers offering frame mounted end suction pumps which may be incorporated in the work include, but are not limited to the following:
 - 1. Amtrol Inc., Thrush Div.
 - 2. Armstrong Pumps, Inc.
 - 3. Bell & Gossett ITT, Fluid Handling Div.
 - 4. Federal Pump Corp.
 - 5. Weinman Pump, LFE Fluids Control Div.

2.3 IN-LINE CIRCULATOR PUMPS:

- A. General: Provide in-line circulator pumps where indicated, and of capacities as scheduled.
- B. Type: Horizontal mount, vertical split case, oil lubricated, designed for 125 PSI working pressure and 225°F (107°C) continuous water temperature.
- C. Body: Cast iron, with suction and discharge gage tappings.
- D. Shaft: Hardened alloy steel.
- E. Bearings: Oil lubricated bronze journal bearings.
- F. Seal: Mechanical, with carbon seal ring and ceramic seat.
- G. Motor: Non-overloading at any point on pump curve, open, dripproof, oil lubricated journal bearings, resilient mounted construction, built-in thermal overload protection on single phase motors. Motors to be high efficiency.
- H. Coupling: Self-aligning, flexible coupling.
- I. Impeller: Enclosed type, hydraulically and dynamically balanced and keyed to shaft.
- J. Available Manufactures: Subject to compliance with requirements, manufacturers offering in-line circulator pumps which may be incorporated in the work include, but are not limited to, the following:
 - 1. Amtrol Inc., Thrush Div.
 - 2. Armstrong Pumps, Inc.
 - 3. Bell & Gossett, ITT Fluid Handling Div.
 - 4. Dunham-Bush, Inc.
 - 5. Taco, Inc.

2.4 ADJUSTABLE FREQUENCY DRIVES AND CONTROLLERS

- A. Pumps, where indicated by specification or schedule, shall be provided with water flow modulation provided by a variable frequency drive with bypass and line reactors. Variable frequency drives must be completely wired, and functionally tested. Adjustable frequency inverter drive shall safely vary the speed of the pump motor allowing the motor to meet the dynamic requirements at the shaft of the motor in response to thermal conditions of the cooling tower water. Properly sized motor protection shall be provided in both drive and bypass modes by a motor overload relay and fuses. Inverter controller shall have a display that provides readout functions that include: output frequency, output voltage, output current, output power, DC bus voltage, interface terminal status, and fault status. In the bypass mode, an output signal

shall be available for a building automation system to make system adjustments to prepare for an across the line start of a fully loaded fan.

- B. Bypass circuitry shall be provided as required to transfer the motor from the adjustable frequency controller to the utility supplied input power or from the line to the AFC controller. Provide motor contactors and interlocks as required. Motor protection per National Electrical Code shall be provided in both the "controller" mode and the "bypass" mode by a motor overload relay. The 115 volt A-C relay control logic allowing common start/stop commands in the "Controller" mode and the "bypass" mode shall also be included within the enclosure. The 115 volt A-C control transformer shall be used for control logic and bypass logic power only. Should the AFD require 115 volt supply, a separate control transformer must be provided. A manual means shall be provided to switch power to the bypass mode in addition to the remote signal.
- C. The adjustable frequency Controller shall be subject to, but not limited to, the following quality assurance controls, procedures and tests.
- D. Digital integrated circuits shall undergo functional and reliability tests.
- E. Electronic printed circuit board assemblies shall be tested for continuity of field and correct components before they are functionally tested.
- F. Every Adjustable Frequency Controller shall be functionally tested under motor load and must pass a 4-hour minimum heat run under motor load. Alternate drive burn-in times are acceptable so long as a comprehensive burn-in under motor load is performed and so that the over-all burn-in exceeds one hour duration.

PART 3 - EXECUTION

3.1 INSTALLATION OF PUMPS:

- A. Install pumps where indicated, in accordance with manufacturer's published installation instructions, with recommended clearances provided for service and maintenance.
- B. Install base-mounted and close coupled pumps on minimum of 4" high concrete base with anchor bolts poured in place. Set and level pump, grout under pump base with non-shrink grout.
- C. Provide piping; accessories; hangers, supports, and anchors; valves; meters and gages; vibration isolation; and equipment supports; as indicated for complete installation.

END OF SECTION 232123

SECTION 233113 – METAL DUCTS AND FANS

PART 1 - GENERAL

1.1 QUALITY ASSURANCE:

- A. SMACNA Compliance: Comply with applicable portions of Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) HVAC duct construction standards, latest edition.
- B. Industry Standards: Comply with American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc. (ASHRAE) recommendations pertaining to construction of duct accessories, except as otherwise indicated.
- C. UL Compliance: Construct, test, and label fire dampers in accordance with Underwriters Laboratories (UL) Standard 555 "Fire Dampers and Ceiling Dampers".
- D. NFPA Compliance: Comply with applicable provisions of ANSI/NFPA 90A "Air Conditioning and Ventilating Systems", pertaining to installation of duct accessories.

1.2 SUBMITTALS:

- A. Product Data: Submit manufacturer's data for each type of duct accessory, including dimensions, capacities, and materials of construction; and installation instructions.
- B. Submit assembly-type shop drawings for each type of duct assembly showing interfacing requirements with ductwork, and method of fastening or support.

PART 2 - PRODUCTS

2.1 FILTERS:

- A. Two Types of filters shall be used where indicated on the drawings: 1" throwaway, and 2" pleated high efficiency throwaway.
- B. All air units shall have filters installed any time they are operated before final acceptance. Provide extra set of filters and install in units just before turning over building to owner. Manufactured by Duststop, Farr, Cambridge, or approved equal.

2.2 DUCTWORK:

- A. Furnish and install all galvanized steel ductwork and housings as shown on drawings. All ducts shall be in conformance with current SMACNA Standards relative to gauge, bracing, joints, etc. Reinforce all housings and all ducts over 30" with 1¼" angles not

less than 5'-6" on centers, and closer if required for sufficient rigidity to prevent vibration. Provide airtight joints and blade elbows. Support horizontal runs of duct on not to exceed 8'-0" centers from strap iron hangers.

- B. All offsets in ducts of 45 degrees or more shall have turning vanes of same gauge as duct and shall be rigidly fastened with guide strips. Vanes in ducts over 30" deep shall be installed in multiple sections with vanes not over 30" long and shall be rigidly fastened.
- C. Provide balancing dampers in all supply runouts, where shown on drawings and wherever necessary for complete control of air flow. Where access to dampers through a suspended ceiling is required, coordinate the proper location of the access doors. Provide "Spin-in" fitting with scoop-type extractor and double bearing volume dampers for all round duct branch takeoffs to individual air devices. Spin-in fittings shall be installed with a minimum of (5-6) five to six sheet metal screws regardless of manufacturer's recommended screw layout.
- D. Round or oval duct shall be spiral lockseam sheet metal, Semco, United, or equal, with smooth interior surface, with round duct gauges per the following table:

	Size	Gauge
1.	14" & under	26
2.	15" thru 26"	24
3.	28" thru 36"	22
4.	38" thru 50"	20
5.	52" thru 60"	18

- E. Fittings shall be welded prefabricated, 20 gauge for 36" fittings and under, 18 gauge for all larger sizes. All 90 degree tee's shall be conical type. Seal all joints in ductwork as recommended by SMACNA.

2.3 FLEXIBLE DUCT:

- A. Flexible duct shall be Class 1, insulation type, polymeric liner with steel wire helix core duct, fiberglass insulation 1½" thick and outer fiberglass vapor barrier jacket. Flexible duct run shall not exceed 10 feet in length, and be installed in as straight a line as possible. Manufactured by Thermaflex "M-KE", Certainteed, Flexmaster.

2.4 DAMPERS:

- A. Low Pressure Manual Dampers: Provide dampers of single blade or multiblade type, constructed in accordance with SMACNA "Low Pressure Duct Standards". Volume dampers shall be opposed blade interlocking type, factory made by Ruskin, APC, Air Balance, or approved equal.

2.5 TURNING VANES:

- A. Fabricated Turning Vanes: Provide fabricated turning vanes and vane runners, constructed in accordance with SMACNA "Low Pressure Duct Standards".
- B. Manufactured Turning Vanes: Provide turning vanes constructed of 1½" wide curved blades set at 1 1/2" o.c., and set into side strips suitable for mounting in ductwork, per SMACNA Standards for low pressure duct.

2.6 DUCT HARDWARE:

- A. Quadrant Locks: Provide for each damper, quadrant lock device on one end of shaft; and end bearing plate on other end for damper lengths over 12". Provide extended quadrant locks and end extended bearing plates for externally insulated ductwork.
- B. Concealed Damper regulators: For dampers located above inaccessible plaster or gypsum board ceilings, provide Young Regulator Co. Model No. 301 CDS concealed regulators with cover plates. Units shall be flush with finished surface. Key shall operate damper rod. Lock nut and spring washer shall hold damper in fixed position.
- C. Bowden Cable Control Dampers: Where indicated on the drawings, (or in lieu of the type 301 system) Bowden cable control dampers (by Young Regulator) are to be provided to control inaccessible manual dampers above inaccessible ceilings. Cable controllers shall be locking with rack and pinion holding damper securely at setting. The control system to consist of a concealed damper regulator, sheathed stainless steel cable system, rack and pinion controller, worm gear actuator and damper compatible with system. Concealed cup regulator to be Young 270-301(FS) with coverplate. System specialties must be submitted for review prior to purchase.

2.7 DUCT ACCESS DOORS:

- A. Construction: Construct of same or greater gate as ductwork served, provide insulated doors for insulated ductwork. Provide flush frames for uninsulated ductwork, extended frames for externally insulated duct. Provide one side hinged, other side with 1 handle type latch for doors 12" high and smaller, 2 handle type latches for larger doors.
- B. All ductwork fire dampers not accessible from removal the ceiling grille shall be provided with an access door to access the linkage. All slot diffusers with fire dampers in the throat and sidewall grille penetrations shall have the connected ductwork supplied with an access door near the fire damper.
- C. All fire damper access doors shall be permanently labeled on the exterior having letters not less than 0.5" in height reading "Fire Damper" in accordance with Code.

2.8 EXHAUST FANS (EF):

- A. Provide tubular centrifugal fan, belt driven, vertical or horizontal mount, as scheduled. Jenn-air, Penn, Greenheck, Acme, Aerolator, Aerovent, Dayton, Cook or equal. Provide aluminum housings as scheduled, with the appropriate spark resistant construction. Provide capacitor-start, induction run type motor for belt driven fans.
- B. Provide fans with inlet and outlet flanges with mounting holes. All fans are to receive a corrosion resistant; refer to Drawings for type and application.
- C. Each fan to be provided with either spring mount vibration isolation or neoprene mounts; Refer to Drawings.
- D. Motors to be high efficiency.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Install duct accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.
- B. Support ducts rigidly with suitable ties, braces, hangers, and anchors of type which will hold ducts true to shape and to prevent buckling.
- C. Seal ductwork, to seal class recommended, and method prescribed in SMACNA "HVAC Duct Construction Standards" Latest Edition.
- D. Complete fabrication of work at project as necessary to match shop fabricated work and accommodate installation requirements.
- E. Locate ductwork runs, except as otherwise indicated, vertically and horizontally and avoid diagonal runs wherever possible. Locate runs as indicated by diagrams, details and notations, or if not otherwise indicated, run ductwork in shortest route which does not obstruct unusable space or block access for servicing building and its equipment. Hold ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building. Limit clearances to ½" where furring is shown for enclosure of concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation. Wherever possible in finished and occupied spaces, conceal ductwork from view, by locating in

mechanical shafts, hollow wall construction or above suspended ceilings. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.

- F. Where ducts pass through interior partitions and exterior walls, conceal space between construction opening and duct over duct-plus-insulation with sheet metal flanges of same gage as duct. Overlap opening on 4 sides by at least 1½".
- G. Where ducts pass thru block walls, ensure that a lintel sized per the structural specifications is provide above penetration.
- H. Install turning vanes in all rectangular supply, return and outside air duct turns 45 deg. or greater.
- I. Coordinate duct installations with installation of accessories, dampers, equipment, controls and other associated work of ductwork system.
- J. Support ductwork in manner complying with SMACNA "HVAC Duct Construction Standards – Latest Edition".

3.2 CLEANING AND PROTECTION:

- A. Clean ductwork internally, unit-by-unit as it is installed, of dust and debris. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration.

3.3 BALANCING:

- A. Seal any leaks in ductwork that become apparent in balancing process.

END OF SECTION 233113

SECTION 233713: GRILLES, REGISTERS, DIFFUSERS, & LOUVERS

PART 1 - GENERAL

1.1 SUBMITTALS:

- A. Product Data: Submit manufacturer's data on outlets and inlets including the following:
- B. Schedule of outlets and inlets indicating drawing designation, room location, number furnished, model number, size and accessories furnished.
- C. Data sheet for each type of outlet and inlet, and accessory furnished; indicating construction, finish, and mounting details.
- D. Performance data for each type of outlet and inlet furnished, velocity traverse, throw and drop, and noise criteria ratings. Indicate selections on data.
- E. Ratings are to be certified by ADC or AMCA.

1.2 PRODUCT DELIVERY, STORAGE, AND HANDLING:

- A. Deliver outlets and inlets wrapped in factory fabricated fiberboard type containers. Identify on outside of container type of outlet or inlet and location to be installed. Avoid crushing or bending and prevent dirt and debris from entering and settling in devices.
- B. Store outlets and inlets in original cartons and protect from weather and construction work traffic. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

PART 2 - PRODUCTS

2.1 CEILING AIR DIFFUSERS:

- A. General: Except as otherwise indicated, provide manufacturer's standard ceiling air diffusers where shown; of size, capacity, direction of throw, and type indicated; constructed of materials and components as specified in this section and as required for complete installation.
- B. Types: Provide ceiling diffusers of type, capacity, and with accessories and finishes as indicated and as specified in this section. The following requirements shall apply:

C. Diffuser Faces:

1. Square: Square housing, core of concentric louvers, square or round duct connection, housing extended to form panel to fit in ceiling module.
2. Rectangular: Rectangular housing, core of rectangular concentric louvers, square or rectangular duct connection.

D. Ceiling Compatibility: Provide diffusers with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems which will contain each type of ceiling air diffuser.

E. Dampers:

1. Opposed Blade: Adjustable opposed blade damper assembly, key operated from face of diffuser.
2. Butterfly: 2 semi-circular flaps connected to linkage adjustable from face of diffuser with key, and with straightening grid.

F. Diffuser Accessories:

1. Operating Keys: Tools designed to fit through diffuser face and operate volume control device and/or pattern adjustment.

G. Available Manufacturers: Subject to compliance with requirements, manufacturers offering diffusers which may be incorporated in the work include, but are not limited to the following:

1. Airguide Corp.
2. Anemostat Products Div., Dynamics Corp. of America
3. Carnes Co., Div. of Wehr Corp.
4. Barber-Colman Co., Air Distribution Div.
5. Environmental Elements Corp., Subs. Koppers Co.
6. Krueger Mfg. Co.
7. Tuttle & Bailey Div. of Interpace Corp.
8. Titus Co.

2.2 CEILING RETURN, EXHAUST AND TRANSFER AIR REGISTERS AND GRILLES:

- A. General: Except as otherwise indicated, provide manufacturer's standard ceiling registers and grilles, where shown, of size, capacity and type indicated; constructed of materials and components as specified in this section; and as required for complete installation.
- B. Ceiling Compatibility: Provide registers and grilles with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems which will contain each type of ceiling register or grille.
- C. Register and Grille Materials:
 - 1. Aluminum Construction: Manufacturer's standard extruded aluminum frames and adjustable blades, unless noted otherwise.
- D. Register and Grille Faces:
 - 1. Horizontal Straight Blades: Horizontal blades, individually adjustable, at manufacturer's standard spacing.
 - 2. Vertical Straight Blades: Vertical blades individually adjustable at manufacturer's standard spacing.
- E. Register Dampers:
 - 1. Opposed Blade: Adjustable opposed blade damper assembly, key operated from face of register.
- F. Register and Grille Accessories:
 - 1. Operating Keys: Tools designed to fit through register or grille face and operate volume control device and/or pattern adjustment.
- G. Available Manufacturers: Subject to compliance with requirements, manufacturers offering registers and grilles which may be incorporated in the work include, but are not limited to the following:
 - 1. Airguide Corp.
 - 2. Anemostat Products Div., Dynamics Corp. of America

3. Barber Colman Co., Air Distribution Div.
4. Carnes Co., Div. of Wehr Corp.
5. Environmental Elements Corp., Subs, Koppers Co.
6. Tempmaster Corp.
7. Titus Co.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Examine areas and conditions under which outlets and inlets are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

- A. General: Install all outlets and inlets as recommended by the manufacturer; in accordance with recognized industry practices; to insure that products serve intended functions.
- B. Coordinate with other work, including ductwork and duct accessories, as necessary to interface installation of outlets and inlets with other work.
- C. Provide transition ductwork as required to mate to the device inlet/outlet.

END OF SECTION 233713.

SECTION 235216 – FIRE-TUBE CONDENSING BOILERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes packaged, factory-fabricated and assembled, gas-fired, fire-tube condensing boilers, trim, and accessories for space heating hot water.

1.3 SUBMITTALS

- A. Product Data: Include performance data, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: For boilers, boiler trim, and accessories.
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Wiring Diagrams: Power, signal, and control wiring.
- C. Source quality-control test reports: Indicate and interpret test results for compliance with performance requirements before shipping.
- D. Field quality-control test reports: Indicate and interpret test results for compliance with performance requirements.
- E. Warranty: Standard warranty specified in this Section.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For boilers to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. ASME Compliance: Fabricate and label boilers to comply with ASME Boiler and Pressure Vessel Code.
- C. ASHRAE/IESNA 90.1 Compliance: Boilers shall have minimum efficiency according to "Gas and Oil Fired Boilers - Minimum Efficiency Requirements."
- D. AHRI Compliance: Boilers shall be AHRI listed and must meet the minimum efficiency specified under AHRI BTS-2000 as defined by Department of Energy in 10 CFR Part 431.
- E. ANSI Compliance: Boilers shall be compliant with ANSI Z21.13 test standards for US and Canada.
- F. CSA Compliant: Boilers shall be compliant with CSA certification.

1.6 COORDINATION

- A. Coordinate size and location of concrete bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

1.7 WARRANTY

- A. Standard Warranty: Boilers shall include manufacturer's standard form in which manufacturer agrees to repair or replace components of boilers that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Fire-Tube Condensing Boilers:
 - a. Heat Exchanger, Pressure Vessel and Condensation Collection Basin shall carry a 10 year limited warranty against defects in materials or workmanship and failure due to thermal shock.
 - b. All other components shall carry a one year warranty from date of boiler start up.

PART 2 - PRODUCTS

2.1 CONSTRUCTION

- A. Description: Boiler shall be natural gas fired, fully condensing, and fire tube design. The boiler shall be factory-fabricated, factory-assembled, and factory-tested, fire-tube condensing boiler with heat exchanger sealed pressure tight, built on a steel base; including insulated jacket; flue-gas vent; combustion-air intake connections; water supply, return, and condensate drain connections; and controls.
- B. Heat Exchanger: The heater exchanger shall bear the ASME "H" stamp for 160 psi working pressure and shall be National Board listed. The heat exchanger shall be constructed of a fully welded 316L stainless steel and of fire tube design. The heat exchanger shall be designed for a single-pass water flow to limit the water side pressure drop. Cast iron, aluminum, or condensing copper tube boilers will not be accepted.
- C. Efficiency: Boilers shall have an AHRI certified minimum thermal efficiency of 97 percent.
- D. Condensate Collection Basin: Fully welded 316L stainless steel and shall include a stainless steel combustion analyzer test port.
- E. Pressure Vessel: The pressure vessel shall be in accordance with ASME Section IV pressure vessel code. The pressure vessel shall be designed for a single-pass water flow to limit the water side pressure drop.
- F. Burner: Natural gas, forced draft single burner premix design. The burner shall be high temperature stainless steel with a woven Fecralloy outer covering to provide modulating firing rates. The burner shall be capable of the stated gas train turndown without loss of combustion efficiency.
- G. Blower: Boiler shall be equipped with a pulse width modulating blower system to precisely control the fuel/air mixture to provide modulating boiler firing rates for maximum efficiency. The burner firing sequence of operation shall include pre-purge, firing, modulation, and post-purge operation.
 - 1. Motors: Comply with requirements specified in Division 23 Section "Common Motor Requirements for HVAC Equipment."
- H. Gas Train: The boiler shall be supplied with a negative pressure regulation gas train and shall be capable of a 7:1 minimum turndowns:
- I. Ignition: Spark ignition with 100 percent main-valve shutoff with electronic flame supervision.
- J. Casing:
 - 1. Jacket: Heavy gauge primed and painted steel jacket with snap-in closures.

2. Control Compartment Enclosures: NEMA 250, Type 1A.
3. Insulation: Minimum ½ inch thick, mineral fiber insulation surrounding the heat exchanger.
4. Combustion-Air Connections: Inlet and vent duct collars.

K. Characteristics and Capacities:

1. Heating Medium: Hot water.
2. Design Water Pressure Rating: 160 psi working pressure.
3. Safety Relief Valve Setting: 50 psig

2.2 TRIM

A. Safety Relief Valve:

1. Size and Capacity: 50 lb.
2. Description: Fully enclosed steel spring with adjustable pressure range and positive shutoff; factory set and sealed.

B. Pressure Gage: Minimum 3-1/2 inch diameter. Gage shall have normal operating pressure about 50 percent of full range.

C. Drain Valves: Minimum NPS 3/4 or nozzle size with hose-end connection.

D. Condensate Neutralization Kit: Factory supplied condensate trap with condensate trip sensor, high capacity condensate receiver prefilled with appropriate medium.

2.3 CONTROLS

A. Refer to Division 23 Section "Instrumentation and Control for HVAC."

B. Boiler controls shall feature a standard, factory installed multi-color graphic LCD screen display with navigation dial and includes the following standard features:

1. Outdoor air reset: Boiler shall calculate the set point using a field installed, factory supplied outdoor sensor and an adjustable reset curve.
2. Pump control: Boiler shall have the ability to control the boiler pump.
3. Ramp delay: Boiler may be programmed to limit the firing rate based on six limits steps and six time intervals.
4. PC port connection: Boiler shall have a PC port allowing the connection of PC boiler software.
5. Time clock: Boiler shall have an internal time clock with the ability to time and date stamp lock-out codes and maintain records of runtime.

6. Maintenance reminder: Boiler shall have the ability to display a yellow colored, customizable maintenance notification screen. All notifications are adjustable by the installer based upon months of installation, hours of operation, and number of boiler cycles.
 7. English Error codes: Boiler shall have a user interface that displays a red error screen with fault codes that are displayed in English and include a date and time stamp for ease of servicing.
 8. Anti-cycling control: Boiler shall have the ability to set a time delay after a heating demand is satisfied allowing the boiler to block a new call for heat. The boiler will display an anti-cycling blocking on the screen until the time has elapsed or the water temperature drops below the anti-cycling differential parameter. The anti-cycling control parameter is adjustable by the installer.
 9. BMS integration with 0-10V DC input: The Control shall allow an option to Enable and control set point temperature or control firing rate by sending the boiler a 0-10V input signal.
 10. Data logging: Boiler shall have non-volatile data logging memory including last 10 lockouts, space heat run hours, domestic hot water run hours and ignition attempts. All data should be visible on the boiler screen.
- C. The boiler shall have a built in Cascade controller to sequence and rotate lead boiler to ensure equal runtime while maintaining modulation of up to 8 boilers of different btu inputs without utilization of an external controller. The factory installed, internal cascade controller shall include:
1. Lead lag: The Control module shall allow only one boiler to fire at the beginning of a call for heat. Once the lead boiler is in full fire and the control calculates that additional heat is required it will call on an additional boiler as needed.
 2. Efficiency optimization: The Control module shall allow multiple boilers to simultaneously fire at minimum firing rate in lieu of Lead/Lag.
 3. Front end loading: The Control module shall allow the cascading and functional control of several non condensing
 4. Rotation of lead boiler: The Control module shall change the lead boiler every hour for the first 24 hours after initializing the Cascade. Following that, the leader will be changed once every 24 hours.
- D. Boiler operating controls shall include the following devices and features:
1. Set-Point Adjust: Set points shall be fully adjustable by the installer.
 2. Sequence of Operation: Factory installed controller to modulate burner firing rate to maintain system water temperature in response to call for heat.

3. Sequence of Operation: Boiler shall come standard with outdoor reset control which will control burner firing rate to reset supply-water temperature inversely with outside-air temperature. At 10 deg F outside-air temperature, set supply-water temperature at 180 deg F; at 60 deg F outside-air temperature, set supply-water temperature at 140 deg F.
- E. Burner Operating Controls: To maintain safe operating conditions, burner safety controls limit burner operation and include:
1. High Temperature Limit: Automatic and manual reset stops burner if operating conditions rise above maximum boiler design temperature. Limit switch to be manually reset on the control interface.
 2. Low-Water Cutoff Switch: Electronic probe shall prevent burner operation on low water. Cutoff switch shall be manually reset on the control interface.
 3. Blocked Inlet Safety Switch: Manual-reset pressure switch field mounted on boiler combustion-air inlet.
 4. High and Low Gas Pressure Switches: Pressure switches shall prevent burner operation on low or high gas pressure. Pressure switches to be manually reset on the control interface.
 5. Blocked Drain Switch: Blocked drain switch shall prevent burner operation when tripped. Switch to be manually reset on the control interface.
 6. Low air pressure switch: Pressure switches shall prevent burner operation on low air pressure. Switch to be manually reset on the control interface.
- F. Building Automation System Interface:
1. Boiler shall have the ability to receive a 0-10V system from a building management system and control by the following:
 - a. 0-10V DC input to control Modulation or Setpoint
 - b. 0-10V DC input Enable/Disable signal
 2. Factory installed Modbus gateway interface to enable building automation system to monitor, control, and display boiler status and alarms.

2.4 ELECTRICAL POWER

- A. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 26 Sections.
- B. Single-Point Field Power Connection: Factory-installed and factory-wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to boiler.
- C. Electrical Characteristics:
1. See Drawings

2. Voltage
 - a. 120V / 1PH
3. Frequency: 60 Hz

2.5 VENTING

- A. Exhaust flue must be Category IV approved PVC, CPVC, PP or stainless steel sealed vent material from one of the approved manufacturers listed in the Installation and Operation manual. Boilers exhaust vent length must be able to extend to 100 equivalent feet.
- B. Intake piping must be of approved material as listed in the Installation and Operations manual. Boilers intake pipe length must be able to extend to 100 equivalent feet.
- C. Boiler venting and intake piping configuration shall be installed per one of the approved venting methods shown in the Installation and Operation manual.
- D. Boilers using common venting must only include like models and the optional common vent damper. Contact the factory for common vent sizing.
- E. Boiler shall come standard with a flue sensor to monitor and display flue gas temperature on factory provided LCD display.
- F. Refer to manufacturer's Installation and Operations manual for detailed venting instructions and approved manufacturers.

2.6 SOURCE QUALITY CONTROL

- A. Burner and Hydrostatic Test: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency; perform hydrostatic test.
- B. Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Before boiler installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting boiler performance, maintenance, and operations.

1. Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in of piping and electrical connections.
- B. Examine mechanical spaces for suitable conditions where boilers will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 BOILER INSTALLATION

- A. Install equipment on 4" concrete housekeeping pad.
- B. Install gas-fired boilers according to NFPA 54.
- C. Assemble and install boiler trim.
- D. Install electrical devices furnished with boiler but not specified to be factory mounted.
- E. Install control wiring to field-mounted electrical devices.

3.3 CONNECTIONS

- A. Install boilers level on concrete bases. Concrete base is specified in Division 23 Section "Common Work Results for HVAC," and concrete materials and installation requirements are specified in Division 03.
- B. Install piping adjacent to boiler to allow service and maintenance.
- C. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.
- D. Connect gas piping to boiler gas-train inlet with union. Piping shall be at least full size of equipment connection. Provide a reducer if required.
- E. Connect hot-water piping to supply and return boiler tapings with shutoff valve and union or flange at each connection.
- F. Install piping from safety relief valves to nearest floor drain.
- G. Boiler Venting:
 1. Install flue venting kit and combustion-air intake.
 2. Connect full size to boiler connections. Comply with requirements in Division 23 Section "Breechings, Chimneys, and Stacks."
- H. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

- I. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
 - 1. Perform installation and startup checks according to manufacturer's written instructions. Complete startup form included with Boiler and return to Manufacturer as described in the instructions.
 - 2. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - a. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level and water temperature.
 - b. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
- C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.

3.5 DEMONSTRATION

- A. Engage a factory representative or a factory-authorized service representative for boiler startup. Start-up sheet shall be completed and a copy shall be sent to the Engineer and the Manufacturer. A combustion analysis shall be completed and the gas valve adjusted per the Installation and Operations manual and note in start-up report.
- B. Factory representative or a factory-authorized representative shall provide Owners training to instruct maintenance personnel to adjust, operate, and maintain boilers. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 235216

SECTION 236513 - CLOSED CIRCUIT EVAPORATIVE COOLING TOWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

- A. Extent of factory-fabricated cooling tower work is indicated on drawings and by provisions of this section, including schedules and equipment lists associated with either drawings or this section.
- B. Types of factory-fabricated cooling towers required for project include the following:
 - 1. Forced draft, centrifugal fan, counterflow, vertical discharge, closed circuit evaporative cooler.
- C. Refer to other Division 23 sections for automatic temperature controls required in conjunction with factory fabricated cooling towers.
- D. Provide motor starters and other control disconnects and power wiring to factory fabricated cooling tower.

1.3 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacturer of factory-fabricated cooling towers, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Provide manufacturer's certification of tower cooling capacity, based on factory performance tests, and provide performance curve plotting Leaving-Water Temperature against Wet-Bulb Temperature.
- C. Cooling tower shall be certified as to performance by the Cooling Tower Institute (CTI).
- D. UL and NEMA Compliance: Provide electric motors and electrical components required as part of factory fabricated cooling towers, which have been listed and labeled by Underwriters Laboratories and comply with NEMA Standards.

1.4 SUBMITTALS:

- A. Product Data: Submit manufacturer's specifications, including rated capacities, pressure drop, fan performance data, weights (shipping, installed, and operating), installation and start-up instructions, and rating curves with selected points clearly indicated.
- B. Shop Drawings: Submit assembly-type shop drawings indicating dimensions, weight loadings, required clearances, and methods of assembly of components.
- C. Wiring Diagrams: Submit ladder-type wiring diagrams for motors and control components, clearly indicating all required field electrical connections.

PART 2 - PRODUCTS

2.1 FACTORY-FABRICATED CLOSED CIRCUIT COOLERS:

- A. General: Fabricate cooling towers using manufacturer's standard design, materials, and construction in accordance with published product information, except as otherwise indicated. Cooling tower shall be a closed circuit fluid cooler type.
- B. Bolt connections with fasteners having equal or better corrosion resistance than materials fastened; seal joints to make water-tight enclosure.
- C. Provide rigging supports on structure for final rigging.
- D. Casings: One of the following materials fabricated and installed by manufacturer to make tower watertight.
- E. Provide galvanized steel with minimum of 2-1/2 oz. of zinc per square foot of surface.
- F. Collecting Basin and Sump: One of the following materials and types of units, designed and installed to support water and to ensure water tightness:
- G. Galvanized steel with minimum of 2-1/2 oz. of zinc per square inch of surface.
- H. Basin to be integral type collecting basin and sump with lift-out strainer with openings smaller than nozzle orifices, and with connections for drain, overflow and water make-up.

- I. Basin covers: One of the following materials installed by manufacturer to prevent debris from entering basin and to inhibit algae growth by eliminating sunlight:
- J. Removable galvanized steel sheet with galvanized handles.
- K. Water Level Control: Provide plastic or bronze mechanical float with adjustable linkage.
- L. Flow Control Valves: Provide one of the following flow control valves for balancing flow to each distribution basin, and for shut-off during servicing:
 - 1. Provide butterfly valves, or
 - 2. Provide self-balancing piping manifold. The determination of self-balancing shall be solely that of the design Engineer.
- M. All moving parts shall be factory assembled and aligned.
- N. The fans and motors shall be located in the dry entering air-stream. The forwardly curved centrifugal fans shall be statically and dynamically balanced. Fan housings shall have curved inlet reigns for efficient air entry. Fans shall be mounted on a steel fan shaft supported by heavy-duty. Furnish drip-proof ball bearing fan motors with 1.15 service factor. Motor shall be located on a heavy-duty motor base, adjustable by means of a single threaded bolt-and-nut arrangement V-belt fan drive shall be designed for motor less than 150% of motor nameplate horsepower. Drive and all moving parts shall be protected by removable hot-dip galvanized screens and panels.
- O. The coil shall be all prime surface steel, have a design pressure of 280 psig. The coil shall be encased in a steel framework and the entire assembly hot-dip galvanized after fabrication.
- P. Water shall be distributed evenly over the heat transfer section. The system shall consist of Schedule 40 PVC header and spray branches with large diameter, non-clog spray nozzles. The branches and spray nozzles shall be quick removal type for cleaning or flushing.
- Q. A close-coupled, bronze fitted centrifugal pump equipped with a mechanical seal, shall be mounted and completely piped to the suction strainer and water distribution system.
- R. The unit shall be furnished with the following accessories:
 - 1. 12.0 KW electric sump heater
 - 2. Make-up water float assembly.

3. Intake screens.
 4. Positive closure dampers and damper actuators.
 5. Insulated Discharge hood.
 6. Vibration isolators and rail supports.
 7. Insulation and heat trace of exterior circulating piping and pump
- S. Provide with evaporative cooler a starter panel with starters control transformer, individual fusing for each fan motor and pump motor, individual hand-auto-off switch for each motor, fan damper wiring and relay, pressure switch, and an additional relay for heat tape. Panel shall be factory mounted and wired. Single point electrical connection.
- T. Manufacturer: Subject to compliance with requirements, provide factory-fabricated cooling towers of one of the following:
1. Baltimore Aircoil Co., Inc.
 2. Evapco
 3. Frick Co., Inc.
 4. LBC, Co.
 5. Marley Cooling Tower Co.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. General: Comply with cooling tower manufacturer's instructions for installation, except as otherwise indicated.
- B. Examine conditions under which cooling towers are to be installed. Correct all unsatisfactory conditions before proceeding with the work.
- C. Level units to a tolerance of 1/8" in 10'-0" in both directions.
- D. Mount cooling tower on base using manufacturer recommended minimum anchor bolts.
- E. Install gaskets or sealants between cooling tower cells.
- F. Connect supply and return lines to cooling towers with union or flanged connections. Pitch lines so water will drain into sump.
- G. Install flexible connections on supply, return, and water make-up lines.
- H. Install balancing valves and shutoff valves so each cooling tower section can be balanced for proper flow, and isolated from other sections.

- I. Connect water make-up line to automatic fill valve with bypass.
- J. Connect bleed line as recommended by manufacturer.
- K. Connect drain and overflow as indicated, run full size to drain.
- L. If tower does not come with the exterior circulating piping and pump insulated and heat traced, then Contract shall do so. Refer to Specification Section 230700 for requirements. Contractor shall be responsible for costs associated for electrical contractor to bring a separate circuit feed if required for the heat trace.

3.2 START-UP:

- A. General: Clean tower thoroughly. Comply with manufacturer's instructions for filling and start-up of operation, but not less than the following:
- B. Verify lubrication of rotating parts; lubricate as needed.
- C. Verify fan rotation direction.
- D. Verify that motor amperage is in accordance with manufacturer's data.
- E. Balance condenser water flow to each tower and to each inlet for multiple inlet towers.
- F. Adjust water level control for proper operating level.
- G. Adjust bleed valve for indicated percentage of circulated water volume.
- H. Adjust temperature controls and verify operation.

3.3 TESTING AND ADJUSTING:

- A. Prior to the equipment start up, the manufacturer of the cooling tower shall provide the services of a factory trained engineer to visit the site and inspect the installation to determine if the equipment has been installed in accordance with the manufacturer's recommended installation procedures. He shall advise the Owner in writing of any recommended corrective action that is required to meet the manufacturer's recommended installation procedures.

3.4 SPARE PARTS:

- A. General: Furnish to Owner, with receipt, the following spare parts:
 - 1. 1 spare set of matched fan belts for each belt driven fan.

2. 1 spare gasket for each gasketed access and inspection opening.
3. 1 valve seat for mechanical water make-up valve.

END OF SECTION

SECTION 238127: UNITARY HVAC EQUIPMENT

PART 1 - GENERAL

1.1 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacturer of terminal units, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. ARI Compliance: Test and rate heat pump units in accordance with Air Conditioning and Refrigeration Institute (ARI) Standards.
- C. UL or ETL Compliance: Construct and install heat pump units in compliance with applicable standards.

1.2 SUBMITTALS:

- A. Shop Drawings: Submit assembly type shop drawings showing unit dimensions, construction details, and field connection details.
- B. Maintenance Data: Submit maintenance instructions, including lubrication instructions, filter replacement, motor, and drive replacement, and spare parts lists. Include this data in maintenance manuals.

PART 2 - PRODUCTS

2.1 PACKAGE ENERGY RECOVERY OUTSIDE AIR INTAKE UNITS (ERU-1)

- A. Provide Greenheck or approved equal indoor or outdoor packaged energy recovery units for the pretreatment of outside air. Unit capacity shall be as specified on the drawings. Unit shall be capable of required operation when exhaust air and outside air is not balanced equally (refer to actual required balance on the schedule).
- B. Unit shall recover heat from the exhaust air stream (or reject heat to the exhaust air stream) through the use of a heat wheel which transfers both latent and sensible heat. The heat wheel shall be removable and cleanable to restore efficiency and shall not require replacement to obtain full latent heat transfer capability. Unit wheels that have the desiccant applied to an aluminum or other metallic wheel are not acceptable. The two air streams, exhaust and supply, shall be non contact - maximum cross-over shall be limited to 3-4%.
- C. Unit shall be wired for single point connection, with two fans and motors. Fans shall be statically and dynamically balanced at the factory.

- D. The cabinet shall be heavy gauge steel and insulated with baked enamel exterior paint system.
- E. Provide unit with the following:
 - High efficiency intake filters
 - Intake and exhaust damper
 - Replaceable exhaust air filters prior to entering heat transfer section.
 - Winter Operation Control Kit with times exhaust for ERV-1

2.2 GAS-FIRED MAKE-UP AIR UNITS

- A. Contractor to provide make-up air units with gas heating to be fully assembled at the factory and consist of an insulated metal cabinet, a motorized intake damper, supply air blower assembly, electrical control unit with all specified components and internal accessories factory installed and tested and prepared for single-point high voltage connection.
- B. CABINET: Materials: Formed, double wall insulated metal cabinet, fabricated to permit access to internal components for maintenance.
 - 1. Outside casing: 18 gauge, galvanized (G90) steel meeting ASTM A653 for components that do not receive a painted finish. Pre-painted components as supplied by the factory shall have polyester urethane paint on 18 gauge G60 galvanized steel. Base rail is 12 gauge, galvanized (G90) steel.
 - 2. Internal Assemblies: 24 gauge galvanized (G90) steel except for motor supports which shall be minimum 14 gauge galvanized (G90) steel.
- C. Comply with NFPA 90A and NFPA 90B and erosion requirements of UL 181.
 - 1. Materials: Fiberglass insulation. If insulation other than fiberglass is used, it must also meet the Fire Hazard Classification shown below.
 - a. Thickness: 1 inch (25 mm)
 - b. Fire Hazard Classification: Maximum flame spread of 25 and smoke developed of 50, when tested in accordance with ASTM C 411.
 - c. Location and application: Floor of each unit shall be insulated with either one half inch thick or 1 inch thick rigid fiberglass insulation, covered on one surface with integral aluminum foil. Full interior coverage from "Heating on".
- D. Access panels: Unit shall be equipped with hinged access panels to provide easy access to all major components. Access panels shall be fabricated of 18 gauge steel.

- E. Supply Air blower assembly: Blower assembly consists of an electric motor and a belt driven, double width, double inlet forward curve blower. Assembly shall be mounted on heavy gauge galvanized rails and further mounted on minimum 1.125 inch thick neoprene vibration isolators.
- F. Control panel / connections: Unit shall have an electrical control center where all high and low voltage connections are made. Control center shall be constructed to permit single-point high voltage power supply connections.
- G. Indirect Gas-Fired Furnace:
 - 1. Shall be assembled, piped, and wired indirect gas-fired system of 80% efficiency with stainless steel heat exchanger.
 - 2. Shall have a cast aluminum or stainless steel burner manifold. Flame rectification shall be provided by a flame rod. Burner control shall have a digital coded fault indicator capable of storing the last five faults.
 - 3. Shall be equipped for operation on Natural gas with a maximum rated inlet gas pressure of 1/2 PSI.
 - 4. Shall have fault sensors to provide fault conditions to optional digital controller or building controls.
 - 5. Shall have temperature control provided by an modulating burner after initial low fire. Control to be by discharge air sensor.
 - 6. Shall include the following safety controls:
 - a. Manual Reset, High Limit Switch: Main gas valve closes if high-limit temperature is exceeded.
 - b. Dual safety shutoff valves shall be provided that do not exceed 120 VAC control signals.
 - c. High Gas Pressure Switch: Main gas valve closes if high pressure switch faults.
- H. Motorized intake air dampers of low leakage type shall be factory installed.
- I. Sensors are considered to be part of various optional operational modes or device controllers and are to be factory supplied and installed as specified by the A/E.
- J. BLOWER: Blower section construction, Supply Air: Belt drive motor and blower shall be assembled onto a minimum 14 gauge galvanized steel platform and must have neoprene vibration isolation devices, minimum of 1 - 1/8 inches thick.

1. Blower assemblies: Shall be statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and horsepower.
 2. Centrifugal blower housing: Formed and reinforced steel panels to make curved scroll housing with shaped cutoff.
 3. Forward curved blower (fan) wheels: Galvanized or aluminum construction with inlet flange and shallow blades curved forward in direction of airflow. Mechanically attached to shaft with set screws.
 4. Blower section motor source quality control: Blower performance shall be factory tested for flow rate, pressure, power, air density, rotation speed and efficiency. Ratings are to be established in accordance with AMCA 210, "Laboratory Methods of Testing Fans for Rating".
- K. MOTORS: General: Blower motors greater than .75 horsepower shall be "NEMA Premium" unless otherwise indicated. Compliance with EPA minimum energy-efficiency standards for single speed ODP and TE enclosures is not acceptable. Motors shall be heavy-duty, permanently lubricated type to match the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150% of driven horsepower and pulleys shall be fully machined cast-type, keyed and fully secured to the fan wheel and motor shafts. Electric motors of ten horsepower or less shall be supplied with an adjustable drive pulley. Comply with requirements in Division 23 05 13, matched with fan load.
1. Motors shall be 60 cycle, 3 phase, 460 volt.
- L. UNIT CONTROLS: The unit shall be constructed so that it can function as a stand-alone heating system controlled by factory-supplied controllers, thermostats and sensors.
1. Unit shall incorporate a DDC controller that provides status, operating settings, and alarm conditions. Controller to be BACNetIP capable.
- M. FILTERS: Unit shall have 2" thick permanent metal filters located in the outdoor air intake and shall be accessible from the exterior of the unit.
- N. Available Manufacturers: Subject to compliance with specifications contained within this document, manufacturers offering products that may be incorporated into the work include, but are not limited to:
1. Greenheck Fan Corporation
 2. Reznor
 3. Modine
 4. Approved equal

2.3 HIGH VOLUME LOW SPEED (HVLS) FANS

- A. High volume, low speed fans shall be large 10-foot diameter, six blade units mounted to the roof support structure. The HVLS fans installation shall provide low velocity, high volume air circulation for cooling and/or destratification heating. Variable speed control shall be offered as part of the finished installation for user and remote selection of operating air velocity.

B. FAN COMPONENTS

- a. Blade Material: Extruded aluminum alloy. Blade finish to be natural anodized
- b. Hub: The hub shall be made from aluminum alloy for high strength and light weight.
- c. Gear Box: The gearbox shall be of a high efficiency type with a reduction ratio matched to the rotational speed of the designed fan's diameter. Gears are to be of a helical cut design for long life and silent running at all speeds. Lubrication shall be high-grade, low foaming oil.
- d. Motor: The fan motor shall be a high efficiency ECM type or ODP or TEFC motor with on-board variable speed drive.
- e. Controls: Variable speed and ON-OFF controls to be integrated with a wall/column mounted control pad
- f. Mounting System: The mounting structural elements shall be fabricated from carbon steel tube and plate with powder coat finish for long life corrosion resistance. The mounting system shall provide quick, secure attachment to structural support beams.
- g. SAFETY FEATURES: The fan mounting system assembly shall be secured to the building structural member with an independent galvanized steel safety cable. The cable shall be designed to carry the full weight of the fan unit in the event of a failure of any of the primary mounting elements. The fan hub shall incorporate an interlock design to prevent the impeller disengaging from the body assembly in the event of a gear box shaft failure. The fan blades shall be secured by a retention system incorporating safety links.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. General: Install HVAC units as indicated and in accordance with manufacturer's installation instructions.

- B. Uncrate units and inspect for damage. Verify that nameplate data corresponds with unit designation.
- C. Protect units with protective covers during balance of construction.
- D. Suspend units on vibration isolators and make duct connections with flexible duct connectors. If units set on floor or platform, set units onto neoprene vibration pads.

3.2 ADJUSTMENT AND CLEANING OF HVAC UNITS:

- A. General: After construction is completed, including painting, clean unit exposed surfaces, vacuum clean terminal coils and inside of cabinets.
- B. Retouch any marred or scratched surfaces of factory finished cabinets, using finish materials furnished by manufacturer.

END OF SECTION

SECTION 238146 - TERMINAL UNITS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Extent of terminal unit work is indicated on drawings and schedules, and by requirements of this section.
- B. Types of terminal units required for project include the following:
 - 1. Hydronic Water Source Heat Pump Units.

1.2 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacturer of terminal units, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. ARI Compliance: Test and rate heat pump units in accordance with Air Conditioning and Refrigeration Institute (ARI) Standards.
- C. UL or ETL Compliance: Construct and install heat pump units in compliance with applicable standards.

PART 2 - PRODUCTS

2.1 CLOSED LOOP HEAT PUMP UNITS (HP)

- A. Water source heat pumps shall be as scheduled on plans. units shall be performance certified as per ARI standard 320. Each unit shall be complete with the following:
- B. Casings: Construct of steel, phosphatized inside and out, and finished with baked enamel. Cabinets shall be insulated.
- C. Fans: Construct of aluminum and factory balanced.
- D. Coils: Construct of plate type aluminum fins, mechanically bonded to heavy copper tubes. Design coil for use in refrigerant applications.
- E. Automatic changeover.
- F. Tamperproof, low voltage controls.
- G. Factory braided metal hose kits. (Note: DO NOT PROVIDE self-balancing hose kits; as

these will be PROHIBITED)

- H. Factory hanger kit.
- I. Programmable thermostats; refer to control specifications.
- J. Condensate pan overflow shut-down switch (for indicated units only). This shall be a level sensing switch.
- K. Two sets of filters (install first set with unit, second set immediately prior to final inspection).
- L. Wiring for single point electrical connection and motor starters as required. All motors shall be permanently lubricated having electrical characteristics as scheduled.
- M. Refrigerant high and low pressure cut-offs shall be provided to prevent harmful operation.
- N. Available Manufacturers: Subject to compliance with requirements, manufacturers offering heat pump units which may be incorporated in the work include, but are not limited to the following:
 - 1. Carrier A/C Group, Carrier Corp.
 - 2. Climate Master
 - 3. McQuay Group, McQuay-Perfex, Inc.
 - 4. Trane Co.
 - 5. Florida Heat Pump

PART 3 - EXECUTION

3.1 HEAT PUMP UNITS

- A. General: Install heat pump units as indicated, and in accordance with manufacturer's installation instructions.
- B. Locate heat pump units as indicated, coordinate with other trades to assure correct fit above ceilings.
- C. Install piping as indicated.
- D. Protect units with protective covers during balance of construction.
- E. Suspend units on vibration isolators and make duct connections with flexible duct connectors.

- F. Where heat pumps are located above a removable lay-in ceiling tile, the Contractor shall place a red thumbtack in the corner of the lay-in ceiling tile at the corner closest to the best access point.

END OF SECTION 238146

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves for raceways and cables.
2. Sleeve seals.
3. Grout.
4. Common electrical installation requirements.

1.2 SUBMITTALS

A. Product Data: For sleeve seals.

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel.
 - 1. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
 - b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
3. Sealing Elements: EPDM or NBR interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
4. Pressure Plates: Stainless steel. Include two for each sealing element.
5. Connecting Bolts and Nuts: Stainless steel]of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors 2 inches above finished floor level.
- G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.

- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 260500

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.
 - 3. Sleeves and sleeve seals for cables.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Copper Conductors: Comply with NEMA WC 70.
- B. Conductor Insulation: Comply with NEMA WC 70 for Types THW and THHN-THWN.

2.2 CONNECTORS AND SPLICES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Hubbell Power Systems, Inc.
 - 3. O-Z/Gedney; EGS Electrical Group LLC.

4. 3M; Electrical Products Division.
 5. Tyco Electronics Corp.
- C. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SLEEVES FOR CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral water-stop, unless otherwise indicated.
- C. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

2.4 SLEEVE SEALS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 1. Advance Products & Systems, Inc.
 2. Calpico, Inc.
 3. Metraflex Co.
 4. Pipeline Seal and Insulator, Inc.
- D. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
 1. Sealing Elements: EPDM or NBR interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 2. Pressure Plates: Stainless steel. Include two for each sealing element.
 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Division 26 Sections "Hangers and Supports for Electrical Systems."
- F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."
- G. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- H. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than un-spliced conductors.
 - 1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.
- I. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.4 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- D. Cut sleeves to length for mounting flush with both wall surfaces.

- E. Extend sleeves installed in floors 2 inches above finished floor level.
- F. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and cable unless sleeve seal is to be installed.
- G. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- H. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and cable, using joint sealant appropriate for size, depth, and location of joint according to Division 07 Section "Joint Sealants."
- I. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at cable penetrations. Install sleeves and seal with firestop materials according to Division 07 Section "Penetration Firestopping."
- J. Roof-Penetration Sleeves: Seal penetration of individual cables with flexible boot-type flashing units applied in coordination with roofing work.
- K. Aboveground Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeves to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- L. Underground Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch annular clear space between cable and sleeve for installing mechanical sleeve seals.

3.5 SLEEVE-SEAL INSTALLATION

- A. Install to seal underground exterior-wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for cable material and size. Position cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.6 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping."

3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, and conductors feeding critical equipment and service for compliance with requirements.
 2. Perform visual inspections, mechanical inspections, and finally electrical megger testing for insulation integrity of the above item #1 conductors. Certify compliance with results of accepted testing parameters with documentation on standard megger testing forms, including weather conditions, meter utilized and the signature of the person performing the testing along with their qualifications to perform this testing.
 3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
 - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
 - b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- C. Test Reports: Prepare a written report to record the following:
1. Test procedures used.
 2. Test results that comply with requirements.
 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
 - a. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes methods and materials for grounding systems and equipment.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
 - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
 - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 6. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
 - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.2 CONNECTORS

- A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.

- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad, 3/4-inch by 10 feet in diameter.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches below grade.
- C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- D. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors, except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 - 1. Feeders and branch circuits.
 - 2. Lighting circuits.
 - 3. Receptacle circuits.
 - 4. Single-phase motor and appliance branch circuits.
 - 5. Three-phase motor and appliance branch circuits.
 - 6. Flexible raceway runs.
 - 7. Armored and metal-clad cable runs.

- B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade, unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating, if any.
 - 2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Division 26 Section "Underground Ducts and Raceways for Electrical Systems," and shall be at least 12 inches deep, with cover.
 - 1. Test Wells: Install at least one test well for each service, unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.
- D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.
- E. Grounding and Bonding for Piping:
 - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- F. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 2. Test completed grounding system at service disconnect enclosure grounding terminal, and at ground rods..
 - a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
- B. Report measured ground resistances that exceed the following values:
1. Power and Lighting Equipment or System with Capacity 500 kVA and Less: 10 ohms.
 2. Power Distribution Panelboards Serving Electronic Equipment: 3 ohm(s).
- C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

Hangers and supports for electrical equipment and systems.

1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design:** Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B.** Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C.** Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength:** Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.3 SUBMITTALS

- A. Product Data:** For steel slotted support systems.
- B. Shop Drawings:** Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze hangers. Include Product Data for components.
 - 2. Steel slotted channel systems. Include Product Data for components.
 - 3. Equipment supports.
- C.** Welding certificates.

1.4 QUALITY ASSURANCE

- A. Welding:** Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B.** Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. ERICO International Corporation.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.
 - f. Unistrut; Tyco International, Ltd.
 - g. Wesanco, Inc.
 - 3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 - 4. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 - 5. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 - 6. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit
- 2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
- 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
- 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
- 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
- 6. Toggle Bolts: All-steel springhead type.
- 7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted [or other] support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
 - 6. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts.
 - 7. To Light Steel: Sheet metal screws.
 - 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Touchup: Comply with requirements in Division 09 painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. See Division 26 Section "Underground Ducts and Raceways for Electrical Systems" for exterior duct banks and manholes, and underground handholes, boxes, and utility construction.

1.2 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, details, and attachments to other work.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

- A. Rigid Steel Conduit: ANSI C80.1.
- B. IMC: ANSI C80.6.
- C. EMT: ANSI C80.3.
- D. FMC: Zinc-coated steel.
- E. LFMC: Flexible steel conduit with PVC jacket.
- F. Fittings for Conduit (Including all Types and Flexible and Liquid tight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
 - 2. Fittings for EMT: Steel or compression type.

2.2 NONMETALLIC CONDUIT AND TUBING

- A. ENT: NEMA TC 13.
- B. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.
- C. LFNC: UL 1660.
- D. Fittings for ENT and RNC: NEMA TC 3; match to conduit or tubing type and material.
- E. Fittings for LFNC: UL 514B.

2.3 BOXES, ENCLOSURES, AND CABINETS

- A. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- B. Cast-Metal Outlet and Device Boxes: NEMA FB 1, aluminum, Type FD, with gasketed cover.
- C. Nonmetallic Outlet and Device Boxes: NEMA OS 2.
- D. Metal Floor Boxes: Cast metal, fully adjustable, rectangular.
- E. Nonmetallic Floor Boxes: Nonadjustable, round.
- F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- G. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.
- H. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Nonmetallic Enclosures: Plastic.
- I. Cabinets:
 - 1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 - 2. Hinged door in front cover with flush latch and concealed hinge.
 - 3. Key latch to match panelboards.
 - 4. Metal barriers to separate wiring of different systems and voltage.
 - 5. Accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
 - 1. Exposed Conduit: Rigid steel conduit or IMC.

2. Concealed Conduit, Aboveground: rigid steel conduit, IMC or EMT.
3. Underground Conduit: RNC, Type EPC-40PVC, direct buried.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFNC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Comply with the following indoor applications, unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: Rigid steel conduit or IMC. Includes raceways in the following locations:
 - a. Mechanical rooms.
4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: Rigid steel conduit or IMC.
7. Raceways for Optical Fiber or Communications Cable: EMT.
8. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.

C. Minimum Raceway Size: 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

3.2 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."
- E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
- H. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Installation at right angles to reinforcement, EC shall place conduit close to slab support.
 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
- I. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- J. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- K. Raceways for Communications Cable: Install as follows:
1. 3/4-Inch Trade Size and Smaller: Install raceways in maximum lengths of 50 feet.
 2. 1-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
 3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
- L. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where otherwise required by NFPA 70.
- M. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet.
1. Install expansion-joint fittings for each of the following locations, and provide type and quantity of fittings that accommodate temperature change listed for location:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
 - c. Indoor Spaces: Connected with the Outdoors without Physical Separation: 125 deg F temperature change.
 - d. Attics: 135 deg F temperature change.
 2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change.
 3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at the time of installation.
- N. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
 2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
- O. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.
- P. Set metal floor boxes level and flush with finished floor surface.
- Q. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Division 31 Section "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
 - b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.
6. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits, placing them 24 inches o.c. Align planks along the width and along the centerline of conduit.

3.4 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly

END OF SECTION 260533

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Identification for raceways.
 - 2. Identification of power and control cables.
 - 3. Identification for conductors.
 - 4. Underground-line warning tape.
 - 5. Warning labels and signs.
 - 6. Instruction signs.
 - 7. Equipment identification labels.
 - 8. Miscellaneous identification products.

1.2 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.

1.3 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.

- C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- D. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- E. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- F. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
 - 2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Colors for Raceways Carrying Circuits at 600 V and Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.
- C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- D. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches wide; compounded for outdoor use.

2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- C. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

- 2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.
- D. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- E. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

2.4 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- C. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- D. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
 - 2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.5 FLOOR MARKING TAPE

- A. 2-inch wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.6 UNDERGROUND-LINE WARNING TAPE

- A. Tape:
 - 1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
 - 2. Printing on tape shall be permanent and shall not be damaged by burial operations.
 - 3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
- B. Color and Printing:
 - 1. Comply with ANSI Z535.1 through ANSI Z535.5.
 - 2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.

3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.

2.7 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Baked-Enamel Warning Signs:
 1. Preprinted aluminum signs punched or drilled for fasteners, with colors, legend, and size required for application.
 2. 1/4-inch grommets in corners for mounting.
 3. Nominal size, 7 by 10 inches.
- D. Metal-Backed, Butyrate Warning Signs:
 1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application.
 2. 1/4-inch grommets in corners for mounting.
 3. Nominal size, 10 by 14 inches.
- E. Warning label and sign shall include, but are not limited to, the following legends:
 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.8 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.
 1. Engraved legend with black letters on white face.
 2. Punched or drilled for mechanical fasteners.
 3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.
- B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.
- C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

2.9 EQUIPMENT IDENTIFICATION LABELS

- A. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.
- B. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.
- C. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

2.10 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Apply identification devices to surfaces that require finish after completing finish work.
- C. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- D. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- E. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches overall.
- G. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

- A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30A, and 120v to ground: Install labels at 30-foot maximum intervals.
- B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
 - 1. Emergency Power.
 - 2. Power.
 - 3. UPS.
- C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
 - 1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded feeder and branch-circuit conductors.
 - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- D. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- E. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source.
- F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
 - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 - 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 - 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- G. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
 - 1. Limit use of underground-line warning tape to direct-buried cables.
 - 2. Install underground-line warning tape for both direct-buried cables and cables in raceway.

- H. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- I. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Baked-enamel warning sign.
 - 1. Comply with 29 CFR 1910.145.
 - 2. Identify system voltage with black letters on an orange background.
 - 3. Apply to exterior of door, cover, or other access.
 - 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.
- J. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- K. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for.
- L. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 - 1. Labeling Instructions:
 - a. Indoor Equipment: engraved limacoid label, Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch high label; where two lines of text are required, use labels 2 inches high.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label Stenciled legend 4 inches high.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - d. Fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

END OF SECTION 260553

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following lighting control devices:
 - 1. Time switches.
 - 2. Outdoor photoelectric switches.
 - 3. Indoor occupancy sensors.
 - 4. Outdoor motion sensors.
 - 5. Lighting contactors.
 - 6. Emergency shunt relay.
- B. See Division 26 Section "Network Lighting Controls" for low-voltage, manual and programmable lighting control systems.
- C. See Division 26 Section "Wiring Devices" for wall-box dimmers, wall-switch occupancy sensors, and manual light switches.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.
- C. Operation and maintenance data.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 2 - PRODUCTS

2.1 TIME SWITCHES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1. Area Lighting Research, Inc.; Tyco Electronics.
 - 2. Intermatic, Inc.
 - 3. Leviton Mfg. Company Inc.
 - 4. Lithonia Lighting; Acuity Lighting Group, Inc.

5. Paragon Electric Co.; Invensys Climate Controls.
 6. Sensor Switch
 7. Watt Stopper (The).
- B. Electronic Time Switches: Electronic, solid-state programmable units with alphanumeric display; complying with UL 917.
1. Contact Configuration: SPST.
 2. Contact Rating: 30-A inductive or resistive, 240-V ac.
 3. Program: 8 on-off set points on a 24-hour schedule and an annual holiday schedule that overrides the weekly operation on holidays.
 4. Program: 2 on-off set points on a 24-hour schedule, allowing different set points for each day of the week and an annual holiday schedule that overrides the weekly operation on holidays.
 5. Programs: channels; each channel shall be individually programmable with 8 on-off set points on a 24-hour schedule.
 6. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program on selected channels.
 7. Astronomic Time: All channels.
 8. Battery Backup: For schedules and time clock.

2.2 INDOOR OCCUPANCY SENSORS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Hubbell Lighting.
 2. Leviton Mfg. Company Inc.
 3. Lithonia Lighting; Acuity Lighting Group, Inc.
 4. Novitas, Inc.
 5. RAB Lighting, Inc.
 6. Sensor Switch, Inc.
 7. TORK.
 8. Watt Stopper (The).
- D. General Description: Wall- or ceiling-mounting, solid-state units with a separate relay unit.
1. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 2. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
 3. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.

4. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box.
 - b. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
 5. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.
 6. Bypass Switch: Override the on function in case of sensor failure.
 7. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; Provide 0-10vdc dimming control with adjustable daylighting discount factor.
- E. PIR Type: Ceiling mounting; detect occupancy by sensing a combination of heat and movement in area of coverage.
1. Detector Sensitivity: Detect occurrences of 6-inch minimum movement of any portion of a human body that presents a target of not less than 36 sq. in.
 2. Detection Coverage (Room): Detect occupancy anywhere in a circular area of 1000 sq. ft when mounted on a 96-inch high ceiling.
 3. Detection Coverage (Corridor): Detect occupancy within 90 feet when mounted on a 10-foot high ceiling.

2.3 OUTDOOR PHOTOELECTRIC SWITCHES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 1. Area Lighting Research, Inc.; Tyco Electronics.
 2. Grasslin Controls Corporation; a GE Industrial Systems Company.
 3. Intermatic, Inc.
 4. Lithonia Lighting; Acuity Lighting Group, Inc.
 5. Novitas, Inc.
 6. Paragon Electric Co.; Invensys Climate Controls.
 7. Square D; Schneider Electric.
 8. TORK.
 9. Touch-Plate, Inc.
 10. Watt Stopper (The).
- D. Description: Solid state, with SPST dry contacts rated for 1800-VA tungsten or 1000-VA inductive, to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A.

1. Light-Level Monitoring Range: 1.5 to 10 fc, with an adjustment for turn-on and turn-off levels within that range, and a directional lens in front of photocell to prevent fixed light sources from causing turn-off.
 2. Time Delay: 15-second minimum, to prevent false operation.
 3. Surge Protection: Metal-oxide varistor, complying with IEEE C62.41.1, IEEE C62.41.2, and IEEE 62.45 for Category A1 locations.
 4. Mounting: Twist lock complying with IEEE C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure.
- E. Description: Solid state, with SPST dry contacts rated for 1800 VA to operate connected load, relay, or contactor coils; complying with UL 773.
1. Light-Level Monitoring Range: 1.5 to 10 fc, with an adjustment for turn-on and turn-off levels within that range.
 2. Time Delay: 30-second minimum, to prevent false operation.
 3. Lightning Arrester: Air-gap type.
 4. Mounting: Twist lock complying with IEEE C136.10, with base.

2.4 LIGHTING CONTACTORS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Allen-Bradley/Rockwell Automation.
 2. ASCO Power Technologies, LP; a division of Emerson Electric Co.
 3. Eaton Electrical Inc.; Cutler-Hammer Products.
 4. GE Industrial Systems; Total Lighting Control.
 5. Grasslin Controls Corporation; a GE Industrial Systems Company.
 6. Hubbell Lighting.
 7. Lithonia Lighting; Acuity Lighting Group, Inc.
 8. MicroLite Lighting Control Systems.
 9. Square D; Schneider Electric.
 10. TORK.
 11. Touch-Plate, Inc.
 12. Watt Stopper (The).
- B. Description: Electrically operated and electrically held, combination type with fusible switch, complying with NEMA ICS 2 and UL 508.
1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).
 2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
 3. Enclosure: Comply with NEMA 250.
 4. Provide with control and pilot devices as indicated on Drawings matching the NEMA type specified for the enclosure.

2.5 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No.14AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 SENSOR INSTALLATION

- A. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.
- B. When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.

3.2 CONTACTOR INSTALLATION

- A. Mount electrically held lighting contactors with elastomeric isolator pads, to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.3 WIRING INSTALLATION

- A. Wiring Method: Comply with Division 26 Section "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size shall be 1/2 inch.
- B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.4 IDENTIFICATION

- A. Identify components and power and control wiring according to Division 26 Section "Identification for Electrical Systems."
 - 1. Identify controlled circuits in lighting contactors.
 - 2. Identify circuits or luminaries controlled by photoelectric and occupancy sensors at each sensor.
- B. Label time switches and contactors with a unique designation.

3.5 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. After installing time switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements.
 - 2. Operational Test: Verify operation of each lighting control device, and adjust time delays.
- B. Lighting control devices that fail tests and inspections are defective work.

END OF SECTION 260923

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes distribution panelboards and lighting and appliance branch-circuit panelboards.

1.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
 - 2. Detail enclosure types and details for types other than NEMA 250, Type 1.
 - 3. Detail bus configuration, current, and voltage ratings.
 - 4. Short-circuit current rating of panelboards and overcurrent protective devices.
 - 5. Include evidence of NRTL listing for series rating of installed devices.
 - 6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 7. Include wiring diagrams for power, signal, and control wiring.
 - 8. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards.
- C. Seismic Qualification Certificates: Submit certification that panelboards, overcurrent protective devices, accessories, and components will withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."
- D. Field quality-control reports.
- E. Panelboard schedules for installation in panelboards.
- F. Operation and maintenance data.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- B. Comply with NEMA PB 1.
- C. Comply with NFPA 70.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

- A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."
- B. Enclosures: Flush- and surface mounted cabinets.
 - 1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
 - b. Outdoor Locations: NEMA 250, Type 3R.
 - 2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
 - 3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
 - 4. Directory Card: Inside panelboard door, mounted in transparent card holder.
- C. Incoming Mains Location: Top and bottom.
- D. Phase, Neutral, and Ground Buses: Hard-drawn copper, 98 percent conductivity.
- E. Conductor Connectors: Suitable for use with conductor material and sizes.
 - 1. Material: Hard-drawn copper, 98 percent conductivity.
 - 2. Main and Neutral Lugs: Compression type.
 - 3. Ground Lugs and Bus Configured Terminators: Compression type.
 - 4. Feed-Through Lugs: Compression type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
 - 5. Subfeed (Double) Lugs: Compression type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
- F. Service Equipment Label: NRTL labeled for use as service equipment for panelboards with one or more main service disconnecting and overcurrent protective devices.
- G. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

- H. Panelboard Short-Circuit Current Rating: Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include size and type of allowable upstream and branch devices, and listed and labeled for series-connected short-circuit rating by an NRTL.
- I. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.2 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
- B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- C. Mains: Circuit breaker or lug.
- D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.
- F. Column-Type Panelboards: Narrow gutter extension, with cover, to overhead junction box equipped with ground and neutral terminal buses.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
- C. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
 - 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replaceable electronic trip; and the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time pickup levels.
 - c. Long- and short-time time adjustments.
 - d. Ground-fault pickup level, time delay, and I^2t response.
4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
5. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
6. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
7. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
8. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Lugs: Compression style, suitable for number, size, trip ratings, and conductor materials.
 - c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
 - d. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
 - e. Communication Capability: Circuit-breaker-mounted communication module with functions and features compatible with power monitoring and control system specified in Division 26 Section "Electrical Power Monitoring and Control."
 - f. Shunt Trip: 120V trip coil energized from separate circuit, set to trip at [55] [75] percent of rated voltage.
 - g. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
 - h. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.
- D. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.
 1. Fuses, and Spare-Fuse Cabinet: Comply with requirements specified in Division 26 Section "Fuses."

2.4 ACCESSORY COMPONENTS AND FEATURES

- A. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Receive, inspect, handle, store and install panelboards and accessories according to NECA 407.
- B. Comply with mounting and anchoring requirements specified in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."
- C. Mount top of trim 90 inches above finished floor unless otherwise indicated.
- D. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- E. Install overcurrent protective devices and controllers not already factory installed.
 - 1. Set field-adjustable, circuit-breaker trip ranges.
- F. Install filler plates in unused spaces.
- G. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.
- H. Arrange conductors in gutters into groups and bundle and wrap with wire ties.
- I. Comply with NECA 1.

3.2 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Division 26 Section "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads and incorporating Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 2. Test continuity of each circuit.
- C. Tests and Inspections:
1. Perform each visual and mechanical inspection and electrical megger testing.
 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- D. Panelboards will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Wall-box motion sensors.
 - 3. Snap switches and wall-box dimmers.
 - 4. Solid-state fan speed controls.
 - 5. Wall-switch and exterior occupancy sensors.
 - 6. Communications outlets.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.
- D. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - 1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
 - 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 - 3. Leviton Mfg. Company Inc. (Leviton).
 - 4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

2.2 STRAIGHT BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; 5351 (single), 5352 (duplex).
 - b. Hubbell; HBL5351 (single), CR5352 (duplex).
 - c. Leviton; 5891 (single), 5352 (duplex).
 - d. Pass & Seymour; 5381 (single), 5352 (duplex).

2.3 GFCI RECEPTACLES

- A. General Description: Straight blade, feed through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; GF20.
 - b. Pass & Seymour; 2084.

2.4 SNAP SWITCHES

- A. Comply with NEMA WD 1 and UL 20.
- B. Switches, 120/277 V, 20 A:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; 2221 (single pole), 2222 (two pole), 2223 (three way), 2224 (four way).
 - b. Hubbell; CS1221 (single pole), CS1222 (two pole), CS1223 (three way), CS1224 (four way).
 - c. Leviton; 1221-2 (single pole), 1222-2 (two pole), 1223-2 (three way), 1224-2 (four way).
 - d. Pass & Seymour; 20AC1 (single pole), 20AC2 (two pole), 20AC3 (three way), 20AC4 (four way).

2.5 WALL PLATES

- A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
 2. Material for Finished Spaces: Smooth, high-impact thermoplastic 0.035-inch.
 3. Material for Unfinished Spaces: Smooth, high-impact thermoplastic.
 4. Material for Damp Locations: Thermoplastic with spring-loaded lift cover, and listed and labeled for use in "wet locations."
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant thermoplastic with lockable cover.

2.6 FINISHES

- A. Color: Wiring device catalog numbers in Section Text do not designate device color.
1. Wiring Devices Connected to Normal Power System: As selected by Architect, unless otherwise indicated or required by NFPA 70 or device listing.
 2. Wiring Devices Connected to Emergency Power System: Red.
 3. TVSS Devices: Blue.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
- B. Coordination with Other Trades:
1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pig-tailing existing conductors is permitted provided the outlet box is large enough.

D. Device Installation:

1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the left.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.

3.2 IDENTIFICATION

A. Comply with Division 26 Section "Identification for Electrical Systems."

1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with white-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

1. Test Instruments: Use instruments that comply with UL 1436.
2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new, and retest as specified above.

END OF SECTION 262726

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fusible switches.
 - 2. Nonfusible switches.
 - 3. Receptacle switches.
 - 4. Shunt trip switches.
 - 5. Molded-case circuit breakers (MCCBs).
 - 6. Enclosures.

1.2 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.3 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to **ASCE/SEI 7**.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

1.4 SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.
- B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Wiring Diagrams: For power, signal, and control wiring.
- C. Seismic Qualification Certificates: For enclosed switches and circuit breakers, accessories, and components, from manufacturer.
- D. Field quality-control reports.
- E. Operation and maintenance data.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **product indicated on Drawings** or comparable product by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
- B. Type GD, General Duty, Single Throw, 240-V ac, 800 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with cartridge fuse interiors to accommodate **indicated** fuses, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.
- C. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
 - 4. Lugs: Suitable for number, size, and conductor material.
 - 5. Service-Rated Switches: Labeled for use as service equipment.

2.2 MOLDED-CASE CIRCUIT BREAKERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **product indicated on Drawings** or comparable product by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
- B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

- C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- D. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:
 - 1. Instantaneous trip.
 - 2. Long- and short-time pickup levels.
 - 3. Long- and short-time time adjustments.
 - 4. Ground-fault pickup level, time delay, and I^2t response.
- E. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.
- F. Features and Accessories:
 - 1. Standard frame sizes, trip ratings, and number of poles.
 - 2. Lugs: Suitable for number, size, trip ratings, and conductor material.
 - 3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
 - 4. Ground-Fault Protection: Comply with UL 1053; **integrally mounted, self-powered** type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
 - 5. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
 - 6. Auxiliary Contacts: **One SPDT switch** with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
 - 7. Alarm Switch: One **NO** contact that operates only when circuit breaker has tripped.

2.3 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
 - 1. Indoor, Dry and Clean Locations: NEMA 250, **Type 1**.
 - 2. Outdoor Locations: NEMA 250, **Type 3R**.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- B. Comply with mounting and anchoring requirements specified in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."

- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- D. Install fuses in fusible devices.
- E. Comply with NECA 1.

3.2 IDENTIFICATION

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- C. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 262816

SECTION 265100 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior lighting fixtures.
2. Emergency lighting units.
3. Exit signs.
4. Lighting fixture supports.

B. Related Sections:

1. Division 26 Section "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
2. Division 26 Section "Wiring Devices" for manual wall mounted dimmers, motion detectors and on off controls.

1.2 SUBMITTALS

- A. Product Data:** For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, and finishes.
- B. Shop Drawings:** Show details of nonstandard or custom lighting fixtures. Indicate dimensions, weights, methods of field assembly, components, features, and accessories. **Product Certificates:** For each type of ballast for bi-level and dimmer-controlled fixtures, from manufacturer.
- C. Field quality-control reports.**

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories:** Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.**

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products:** Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, product(s) indicated on Drawings].

2.2 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. Metal Parts: Free of burrs and sharp corners and edges.
- C. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.
- D. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit cleaning and maintenance without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during cleaning and maintenance and when secured in operating position.
- E. Diffusers and Globes:
 - 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - a. Lens Thickness: At least [0.125 inch minimum unless otherwise indicated.
 - b. UV stabilized.
 - 2. Glass: Annealed crystal glass unless otherwise indicated.

2.3 EMERGENCY POWER UNIT

- A. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body and compatible with driver. Comply with UL 924.
 - 1. Test Push Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
 - a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - 2. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - 3. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
 - 4. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.4 EXIT SIGNS

- A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:

1. Lamps for AC Operation: Fluorescent, two for each fixture, 20,000 hours of rated lamp life.
2. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.
3. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
 - a. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - b. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 - d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

2.5 EMERGENCY LIGHTING UNITS

- A. General Requirements for Emergency Lighting Units: Self-contained units complying with UL 924.
 1. Battery: Sealed, maintenance-free, lead-acid type.
 2. Charger: Fully automatic, solid-state type with sealed transfer relay.
 3. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 4. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 5. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 6. Wire Guard: Heavy-chrome-plated wire guard protects lamp heads or fixtures.
 7. Integral Time-Delay Relay: Holds unit on for fixed interval of 15 minutes when power is restored after an outage.

2.6 LIGHTING FIXTURE SUPPORT COMPONENTS

- A. Comply with Division 26 Section "Hangers and Supports for Electrical Systems" for channel- and angle-iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.
- C. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
- D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage.

- E. Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage.
- F. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
- G. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.
- B. Comply with NFPA 70 for minimum fixture supports.
- C. Suspended Lighting Fixture Support:
 - 1. Pendants and Rods: Where longer than 48 inches brace to limit swinging.
 - 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
 - 3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
- D. Adjust aimable lighting fixtures to provide required light intensities.
- E. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.2 FIELD QUALITY CONTROL

- A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.
- B. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION 265100

SECTION 265600 - EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Exterior luminaires with lamps and ballasts.
 - 2. Luminaire-mounted photoelectric relays.
 - 3. Poles and accessories.

1.2 SUBMITTALS

- A. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, and finishes.
- B. Shop Drawings: Anchor-bolt templates keyed to specific poles and certified by manufacturer.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with IEEE C2, "National Electrical Safety Code."
- C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, product(s) indicated on Drawings.

2.2 GENERAL REQUIREMENTS FOR LUMINAIRES

- A. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.
- B. Lateral Light Distribution Patterns: Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.
- C. Metal Parts: Free of burrs and sharp corners and edges.

- D. Sheet Metal Components: Corrosion-resistant aluminum unless otherwise indicated. Form and support to prevent warping and sagging.
- E. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.
- F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions. Doors shall be removable for cleaning or replacing lenses.
- G. Exposed Hardware Material: Stainless steel.
- H. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
- I. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.
- J. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
- K. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- L. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.
- M. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
 - 2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
 - a. Color: As selected from manufacturer's standard catalog of colors.
- N. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 - 2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.

3. Class I, Clear Anodic Finish: AA-M32C22A41 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
4. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
 - a. Color: selected by architect at time of shop drawing submittals– provide color samples on similar metal as luminaire that is to be provided..

PART 3 - EXECUTION

3.1 LUMINAIRE INSTALLATION

- A. Fasten luminaire to indicated structural supports.
 1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
- B. Adjust luminaires that require field adjustment or aiming.

3.2 CORROSION PREVENTION

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
- B. Steel Conduits: Comply with Division 26 Section "Raceway and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch-thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.3 GROUNDING

- A. Ground metal poles and support structures according to Division 26 Section "Grounding and Bonding for Electrical Systems."
 1. Install grounding electrode for each pole unless otherwise indicated.
 2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.

END OF SECTION 265600

SECTION 283116 - FIRE ALARM SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections:
 - 1. Division 01 General Requirements
 - 2. Division 07 Thermal and Moisture Protection, Section 078413 Penetration Firestopping
 - 3. Division 08 Openings, Section 087100 Door Hardware
 - 4. Division 21 Fire Suppression
 - 5. Division 23 Heating Ventilating and Air Conditioning Monitoring & Control (HVAC).
 - 6. Division 26 Electrical, Section 260500 Common Work Results for Electrical

1.02 SUMMARY

- A. Section Includes:
 - 1. This specification describes an addressable Fire Detection and alarm signaling system. The control panel shall be intelligent device addressable, analog detecting, low voltage and modular, with digital communication techniques, in full compliance with all applicable codes and standards. The features and capacities described in this specification are required as a minimum for this project and shall be furnished by the successful contractor.
 - 2. The system shall be in full compliance with National and Local Codes.
 - 3. The system shall include all required hardware, raceways, interconnecting wiring and software to accomplish the requirements of this specification and the contract drawings, whether or not specifically itemized herein.
 - 4. All equipment furnished shall be new and the latest state-of-the-art products of a single manufacturer, engaged in the manufacturing and sale of analog fire detection devices for over ten years.
 - 5. The system as specified shall be supplied, installed, tested and approved by the local Authority Having Jurisdiction, and turned over to the owner in an operational condition.
 - 6. In the interest of job coordination and responsibilities, the installing contractor shall contract with a single supplier for fire alarm equipment, engineering, programming, inspection and tests, and shall be capable of providing a "UL Listing Certificate" for the complete system.

7. The system specified shall be that of the EDWARDS FIRE AND LIFE SAFETY COMPANY, which meets the project requirements. Systems manufactured by Simplex or Siemens will be considered for prior approval. Provide submittals of proposed equipment 10 days prior to bid date for prior approval consideration by the Engineer. Equipment approved shall meet all the requirements spelled out in this specification.

1.03 DEFINITIONS

- A. ASME: American Society of Mechanical Engineers.
- B. FACP: Fire alarm control panel.
- C. FM: FM Global (Factory Mutual).
- D. Furnish: To supply the stated equipment or materials.
- E. Install: To set in position and connect or adjust for use.
- F. LED: Light-emitting diode.
- G. NCC: Network Command Center.
- H. NFPA: National Fire Protection Association. Definitions in NFPA 72 apply to fire alarm terms used in this Section.
- I. NICET: National Institute for Certification in Engineering Technologies.
- J. Provide: To furnish and install the stated equipment or materials.
- K. UL: Underwriters Laboratories.

1.04 SYSTEM DESCRIPTION

- A. The system shall be a complete, electrically supervised fire detection and notification system, with a microprocessor-based operating system having the following capabilities, features, and capacities:
 1. The local system shall provide status indicators and control switches for all of the following functions:
 - a. Audible and visual notification alarm circuit zone control.
 - b. Status indicators for sprinkler system water-flow and valve supervisory devices.
 - c. Any additional status or control functions as indicated on the drawings, including but not limited to; emergency generator functions, fire pump functions, door unlocking and security with bypass capabilities.

1.05 PERFORMANCE REQUIREMENTS

- A. General Performance: Comply with NFPA 72 and all contract documents and specification requirements.

- B. All interconnections between this system and the monitoring system shall be arranged so that the entire system can be UL-Certificated.
- C. System shall be a complete, supervised, non-coded, addressable multiplex fire alarm system conforming to NFPA 72.
- D. The system shall operate in the alarm mode upon actuation of any alarm initiating device. The system shall remain in the alarm mode until all initiating device(s) are reset and the fire alarm control panel is manually reset and restored to normal.
- E. The system shall be capable of the following configurations. Both configurations are permitted on the same network.
- F. The system shall be provided with digital alarm communication transmitter.
- G. The system shall provide an off-normal warning prior to reset for all active devices.
- H. The system shall be capable of remote monitoring via a proprietary software system that provides a graphical representation of the fire alarm control panel at a remote PC when connected via Ethernet to the system. The display will show the exact state of the panel, including blinking LEDs, and with menu buttons for control.
- I. The system shall be capable of being configured via a PC Tool.
- J. The system shall provide the following functions and operating features:
 - 1. The FACP and auxiliary power panels shall provide power, annunciation, supervision and control for the system.
 - 2. Provide Class B initiating device circuits.
 - 3. Provide two Class B notification appliance circuits. Arrange circuits to allow individual, selective, and visual notification by zone. Notification appliance circuits shall be zoned to correspond with the building fire barriers and other building features.
 - 4. Strobes shall be synchronized throughout the entire building.
 - 5. Provide electrical supervision of the primary power (AC) supply, presence of the battery, battery voltage, and placement of system modules within the control panel.
- K. The system shall provide a field test function where one person can test the complete system or a specific area while maintaining full operational function of other areas not being tested. Alarms, supervisory signals, trouble signals shall be logged in system history during the walk-test.
- L. Alarm functions shall override trouble or supervisory functions. Supervisory functions shall override trouble functions.
- M. Fire alarm signal initiation shall be by one or more of the following devices:
 - 1. Manual pull station
 - 2. Heat detector

3. Addressable area smoke detectors
 4. Standard Addressable Duct smoke detector
 5. Specialized Duct Smoke detector
 6. Automatic sprinkler system water flow switch.
- N. Activation of any system fire, security, supervisory, trouble, or status initiating device shall cause the following actions and indications at all network Person Machine Interfaces using an LCD display with multiple detail screens.
1. Fire Alarm Condition:
 - a. Sound an audible alarm and display a custom message defining the building in alarm and the specific alarm point initiating the alarm on an LCD display.
 - b. Log into the system history archives all activity pertaining to the alarm condition.
 - c. Sound the ANSI 117-1 signal with synchronized audible notification appliances and synchronized strobes throughout the facility.
 - d. Audible signals shall be silenced from the fire alarm control panel by an alarm silence switch. Visual signals shall be programmable to flash until system reset or alarm silencing, as required.
 - e. A signal dedicated to sprinkler system water flow alarm shall not be silenced while the sprinkler system is flowing at a rate of flow equal to a single head.
 - f. System operated duct detectors as per local requirements shall accomplish HVAC shut down.
 2. Supervisory Condition:
 - a. Display the origin of the supervisory condition report at the local fire alarm control panel LCD display.
 - b. Activate supervisory audible and dedicated visual signal.
 - c. Audible signals shall be silenced from the control panel by the supervisory acknowledge switch.
 - d. Record within system history the initiating device and time of occurrence of the event.
 3. Trouble Condition
 - a. Display at the local fire alarm control panel LCD display, the origin of the trouble condition report.
 - b. Activate trouble audible and visual signals at the control panel and as indicated on the drawings.

- c. Audible signals shall be silenced from the fire alarm control panel by a trouble acknowledge switch.
 - d. Trouble conditions that have been restored to normal shall be automatically removed from the trouble display queue and not require operator intervention. This feature shall be software selectable and shall not preclude the logging of trouble events to the historical file.
 - e. Trouble reports for primary system power failure to the master control shall be automatically delayed for a period of time equal to 25% of the system standby battery capacity to eliminate spurious reports as a result of power fluctuations.
 - f. Record within system history, the occurrence of the event, the time of occurrence and the device initiating the event.
- O. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1.06 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories. Complete manufacturer's catalog data including supervisory power usage, alarm power usage, physical dimensions, and finish and mounting requirements.
- B. Power calculations. Battery capacity calculations. Battery size shall be a minimum of 125% of the calculated requirement. Provide the following supporting information:
 - 1. Supervisory power requirements for all equipment.
 - 2. Alarm power requirements for all equipment.
 - 3. Power supply rating justification showing power requirements for each of the system power supplies. Power supplies shall be sized to furnish the total connected load in a worst-case condition plus 25% spare capacity.
 - 4. Voltage drop calculations for wiring runs demonstrating worst-case condition.
 - 5. NAC circuit design shall incorporate a 15% spare capacity for future expansion.
- C. Submit manufacturer's requirements for testing Signaling Line Circuits and device addresses prior to connecting to control panel. At a minimum the following tests shall be required; device address, the usage (Alarm, Supervisory etc), environmental compensation, temperature ratings for thermal detectors and smoke detector sensitivities. This requirement shall need approval before any wiring is connected to the control panel.
- D. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Wiring Diagrams: For power, signal, and control wiring.

3. Complete drawings covering the following shall be submitted by the contractor for the proposed system:
 - a. Floor plans in a CAD compatible format at a scale of 1/8"=1'-0" showing all equipment and raceways, marked for size, conductor count with type and size, showing the percentage of allowable National Electric Code fill used.
 - b. Provide a fire alarm system function matrix as referenced by NFPA 72, Figure A-7-5.2.2 (9). Matrix shall illustrate alarm input/out events in association with initiation devices. Matrix summary shall include system supervisory and trouble output functions. Include any and all departures, exceptions, variances or substitutions from these specifications and/or drawings at time of bid.
4. Installation drawings shop drawings, and as-built drawings shall be prepared by an individual experienced with the work specified herein.
5. Incomplete submittals shall be returned without review, unless with prior approval of the Engineer.
- E. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
 1. Light fixtures.
 2. HVAC registers
 3. Fire protection equipment interfaces
 4. Special suppression system interfaces
- F. Qualification Data: For qualified Installer, manufacturer, fabricator, testing agency, and factory-authorized service representative.
- G. Source quality-control reports.
- H. Field quality-control reports.
- I. Operation and Maintenance Data: For all fire alarm equipment, to include in operation and maintenance manuals.
- J. Software and Firmware Operational Documentation:
 1. Software operating and upgrade manuals.
 2. Program Software Backup: On magnetic media or compact disk, complete with data files.
 3. Device address list.
 4. Printout of software application and graphic screens.
- K. Warranty: Sample of special warranty.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: The publications listed below form a part of this publication to the extent referenced. The publications are referenced in the text by the basic designation only. The latest version of each listed publication shall be used as a guide unless the authority having jurisdiction has adopted an earlier version.

1. FM Global (Factory Mutual (FM)):FM Approval Guide
2. National Fire Protection Association (NFPA)
 - a. NFPA 70 National Electrical Code
 - b. NFPA 72 National Fire Alarm Code
 - c. NFPA 90A Standard For The Installation of Air Conditioning and Ventilating Systems
 - d. NFPA 101 Life Safety Code
3. Underwriters' Laboratories, Inc. (UL) equipment standards, Latest Edition
 - a. UL Fire Protection Equipment Directory
 - b. UL Electrical Construction Materials Directory
 - c. UL 38 – Manually Actuated Signaling Boxes for Use With Fire Protection Signaling Systems
 - d. UL 228 – Door Holding Devices
 - e. UL 268 - Smoke Detectors for Fire Protective Signaling Systems
 - f. UL 268A - Smoke Detectors for Duct Application
 - g. UL 464 - Audible Signal Appliances
 - h. UL 497A – Secondary Protectors for Communications Circuits
 - i. UL 521 - Heat Detectors for Fire Protective Signaling Systems
 - j. UL 864 - Control Units for Fire Protective Signaling Systems
 - k. UL 1283 – Electromagnetic Interference Filters
 - l. UL 1449 - Transient Voltage Surge Suppressors
 - m. UL 1971 - Signaling Devices for the Hearing Impaired
4. International Code Council
 - a. International Building Code
 - b. International Fire Code.

5. State and Local Building Codes as adopted and/or amended by The Authority Having Jurisdiction, ADA, and/or State and local equivalency standards as adopted by The Authority Having Jurisdiction.
6. ISO 9002

B. Supplier Qualifications

1. The manufacturer of the supplied products must utilize multi-channel product distribution on a national basis to be considered for this bid. The manufacturer must have factory branches as well as independent distributors to allow the end user with the ability to utilize factory trained and authorized competitive service providers after system installation and commissioning.
2. Provide the services of a factory trained and certified representative or technician, experienced in the installation and operation of the type of system provided.
3. The technician shall supervise installation, software documentation, adjustment, preliminary testing, final testing and certification of the system. The technician shall provide the required instruction to the owner's personnel in the system operation and maintenance.
4. The suppliers shall furnish evidence they have an experienced service organization, which carries a stock of spare and repair parts for the system being furnished.
5. The equipment supplier shall be authorized and trained by the manufacturer to calculate, design, install, test, and maintain the air sampling system and shall be able to produce a certificate stating such upon request.

C. Installer Qualifications:

1. Before commencing work, submit data showing that the manufacturer has successfully installed fire alarm systems of the same scope, type and design as specified.
2. The contractor shall submit copies of all required Licenses and Bonds as required in the State having jurisdiction.
3. Contractors unable to comply with the provisions of Qualification of Installers shall present proof of engaging the services of a subcontractor qualified to furnish the required services.

D. Testing Agency Qualifications: Qualified for testing indicated.

E. Source Limitations for fire alarm equipment: Obtain fire alarm equipment from single source.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to project site in original, unopened packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, and shelf life if applicable.

- B. Store materials inside, under cover, above ground, and kept dry and protected from physical damage until ready for use. Remove from site and discard wet or damaged materials.

1.09 PROJECT CONDITIONS

- A. Installed products or materials shall be free from any damage including, but not limited to, physical insult, dirt and debris, moisture, and mold damage.
- B. Environmental Limitations: Do not deliver or install products or materials until spaces are enclosed and weather-tight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire alarm equipment that fail(s) in materials or workmanship within specified warranty period.
 - 1. Labor Installation Warranty Period: 1 year from date of Substantial Completion.
 - 2. Equipment warranty Period: 3 years from date of shipment, with a provision to extend the warranty to 7 years with a signed service agreement Warranty Period: 1 year from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements all equipment shall be Edwards Fire and Life Safety Company or approved equal systems as manufactured by Siemens or Simplex subject to prior approval by the project engineer. See paragraph 1.02 (A) (7) hereinbefore.

2.02 CONTROL PANEL

- A. The fire alarm control panel shall be microprocessor based using multiple microprocessors throughout the system providing rapid processing of smoke detector and other initiation device information to control system output functions.
- B. There shall be a watchdog circuit, which shall verify the system processors and the software program. Problems with either the processors or the system program the panel shall activate a trouble signal and reset the panel.
- C. The system modules shall communicate with an RS 485 network communications protocol. All module wiring shall be to terminal blocks.
- D. The system shall be capable of the following site-specific configurations. Both configurations are permitted on the same network.
 - a. Air handler shutdown, for testing purposes
 - b. Notification appliances disable for testing purposes

2. The system shall support up to 1000 addressable devices, with no restriction on how many separate circuits can be created other than the maximum device count.
 3. The system shall support up to four SLC of 250 addressable devices per circuit, with no restriction on how many separate circuits can be created other than the maximum device count.
- E. The system shall be capable of supporting unshielded wiring applications.
- F. System Components:
1. The system periphery board shall be capable of supporting two system drivers of 250 intelligent devices distributed between one, two, three, or four Class B SLC circuits, for a total panel capacity of 504 addressable devices. Any trouble on one circuit shall not affect the other circuit. This module controls the signaling from the initiation devices reporting alarms and troubles to the control panel. This module shall also provide the signaling to the field devices for the controlling the output of specific initiation devices. The on board microprocessor provides the periphery board with the ability to function even if the main microprocessor fails. LED's on the board shall provide annunciation for the following: Power, Gnd. Fault, Alarm, Trouble. The board shall be model # FCI2016-U1.
 2. The Signal Line Circuits (SLC) shall be tested for opens, shorts and communications with all addressable devices installed before connection to the control panel. Systems without this capability shall have a test panel installed for initial testing to eliminate any possible damage short term or long term to the control panel. After initial testing replace the test panel and proceed with complete testing.
 3. The standard Operator Interface shall have the ability to view events, acknowledge, silence, and reset the system .
 4. The system periphery board shall be capable of supporting four system drivers of 250 intelligent devices with no restriction on how many separate circuits can be created other than the maximum device count, for a total panel capacity of 1000 addressable devices. Any trouble on one circuit shall not affect the other circuit. This module controls the signaling from the initiation devices reporting alarms and troubles to the control panel. This module shall also provide the signaling to the field devices for the controlling the output of specific initiation devices. The on board microprocessor provides the periphery board with the ability to function even if the main microprocessor fails. LED's on the board shall provide annunciation for the following: Power, Gnd. Fault, Alarm, Trouble. This board is integral to the system. The board shall be model number FCI2017-U1.
 5. The LCD/LED Operator Interface shall have the ability to view events, acknowledge, silence, and reset the system.
 6. The System Periphery Board shall contain 4 Class B NAC circuits with 6 amps of power distributed across all four circuits, with power-limited outputs. The zones shall be isolated and independently supervised.
 7. The control panel shall be equipped with three Form C relays for alarm, trouble, and supervisory. The system shall provide the mounting of all system cards, field wiring, and panel's inter-card wiring. All power limited field wiring shall be separated from all non-power limited internal wiring.

- G. System response time from alarm to output shall be an average of three (3) seconds.
- H. All system cards and modules shall have Flash memory for downloading the latest module firmware.
- I. Passwords:
 - 1. Technician Level Password - There shall be a 4-character password that a user must enter into the control panel in order to perform such maintenance- and control-related functions at the panel as:
 - a. Arming and disarming devices.
 - b. Activating, deactivating, or modifying detector ASD and sensitivity settings.
 - c. Activating and deactivating the History Log function, and deleting obsolete entries.
 - d. Changing the system time and date.
 - 2. Maintenance Level Password - There shall be a 4-character password that a user must enter into the control panel in order to access the panel's reporting functions and walktest functions.
 - 3. Acknowledge Silence-able Reset Access - There shall be a key required to open a locked cabinet that a system user must use in order to acknowledge events, turn silence-able audibles and visuals on and off, and perform panel resets.
- J. Software Modifications: The system structure and software shall place no limit on the type or extent of software modifications on-site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being made. Systems that require the use of external programmers or change of EPROMs are not acceptable.
- K. Logic: The fire alarm system shall support generic functions that deal with binary states (True/False, high/low), and produce desired outputs from one or more binary inputs (for example, alarm outputs from detector or manual station inputs). AND, OR, NOT, Any N, Latches, Start Timer, Delay Timer, Restart Timer are generic functions. Generic functions can be used as inputs to other function. The system shall support 500 logic functions.
- L. History: The system shall store 2000 events in history. Trouble warnings will occur when the History buffer is full.

2.03 POWER SUPPLY

- A. The system Power Supply shall provide adequate power to supply all electronic components available with the panel and 6-amps of useable 24 vdc power for auxiliary needs and NACs. The power supply shall be filtered and regulated. The power supply provides power for all system operation, including signaling line circuits, notification appliance circuits, auxiliary power, battery charger, and all optional modules. The power supply shall be rated for 120/240 VAC 50/60 Hz.

- B. The battery charger shall be able to charge the system batteries up to 26 AH batteries. Battery charging shall be microprocessor controlled and programmed to select battery sizes.
- C. Power supplies that transfer from AC to DC on AC power failure shall not be accepted, system shall run off of battery power constantly for a smooth and undiscernible transfer when AC Power fails.

2.04 SYSTEM ENCLOSURE

- A. Provide the enclosure as specified. Provide the color as to the local AHJ requirements.
- B. Provide Red cabinet enclosure.

2.05 INTELLIGENT INITIATING DEVICES

A. General

- 1. All initiation devices shall be insensitive to initiating loop polarity. Specifically, the devices shall be insensitive to plus/minus voltage connections.

B. Smoke Detectors – Standard Addressable H-Series

- 1. The detector shall be guaranteed in writing not to false alarm when configured by the factory trained certified technician. The detector must provide up to 11 different environmental algorithms that allow the detector to provide superior false alarm immunity without the need for additional alarm verification delays.
- 2. The detector shall have a multicolor LED to streamline system maintenance/inspection by plainly indicating detector status as follows: green for normal operation, amber for maintenance required, red for alarm.
- 3. The multi-criteria smoke detector shall be an intelligent digital photoelectric detector with a programmable heat detector. Detectors shall be listed for use as open area protective coverage, in duct installation and sampling assembly installation and shall be insensitive to air velocity changes. The detector communications shall allow the detector to provide alarm input to the system and alarm output from the system within four (4) seconds. So as to minimize the effort required by the installing and maintenance technician to appropriately configure the detector to ensure optimal system design, the detectors shall be programmable as application specific. Application settings shall be selected in software for a minimum of eleven environmental fire profiles unique to the devices installed location.
- 4. The detector shall be designed to eliminate the possibility of false indications caused by dust, moisture, RFI/EMI, chemical fumes and air movement while factoring in conditions of ambient temperature rise, obscuration rate changes and hot/cold smoke phenomenon into the alarm decision to give the earliest possible real alarm condition report.
- 5. The intelligent smoke detector shall be capable of providing three distinct outputs from the control panel. The outputs shall be from an input of smoke obscuration, a thermal condition or a combination of obscuration and thermal conditions. The detector shall be designed to eliminate calibration errors associated with field cleaning of the chamber.

6. The detector shall support the use of a relay, or LED remote indicator without requiring an additional software address. Low profile, white case shall not exceed 2.5 inches of extension below the finish ceiling.
7. For the detector where required, there shall be available a locking kit and detector guard to prevent unauthorized detector removal.
8. The smoke detector shall be model number Siga-OSD

C. Heat Detectors – Addressable

1. Thermal Detectors shall be rated at 135 degrees fixed temperature and 15 degrees per minute rate of rise. Detectors shall be constructed to compensate for the thermal lag inherent in conventional type detectors due to the thermal mass, and alarm at the set point of 135 degrees Fahrenheit. The choice of alarm reporting as a fixed temperature detector or a combination of fixed and rate of rise shall be made in system software and be changeable at any time without the necessity of hardware replacement.
2. The detectors furnished shall have a listed spacing for coverage up to 2,500 square feet and shall be installed according to the requirements of NFPA 72 for open area coverage. The thermal detector shall be model number Siga-HRD
3. Heat detector shall have the following temperature settings:
 - a. Fixed temperature at 135°F, 145°F, 155°F, 165°F, 174°F
 - b. Rate of Rise at 15°F/ min (8.3°C) at 135°F (57°C)
 - c. Rate of Rise at 15°F/ min (8.3°C) at 174°F (79°C)
 - d. Low temperature warning at 40°F (4.4°C)

D. Duct Smoke Detectors – Addressable

1. For duct detector applications, the smoke detector shall be an intelligent digital photoelectric detector. Detectors shall be listed for use as open area protective coverage, in duct installation and sampling assembly installation and shall be insensitive to air velocity changes.
2. The detector communications shall allow the detector to provide alarm input to the system and alarm output from the system within four (4) seconds. The detector shall be mounted in a duct detector housing listed for that purpose. The duct detector shall support the use of a remote test switch, relay or LED remote indicator. The duct detector shall be supplied with the appropriate sampling tubes to fit the installation.
3. Where duct detectors are exposed to the weather a weatherproof enclosure shall be available. The duct housing cover shall include a test port for functional testing of the detector without cover removal. The duct housing shall include a cover removal switch capable of indicating cover removal status to the fire alarm control panel.
4. The intelligent duct detector shall be model number Siga-SD Where required there shall be available a duct housing with an on-board relay. Also, where required, there shall be a standalone housing available with its own power supply and test/reset switch that does not require connection to a fire alarm control panel.

5. Duct smoke detector housing shall allow use in duct systems with air velocity ranging from 100 to 4,000 feet per minute, within temperature ranges of -20°F to 158°F per minute, and with relative humidity ranging from 0 to 93%.

E. Manual Pull Stations – Addressable

1. Provide addressable manual stations were shown on the drawings, to be flush or surface mounted as required. Manual stations shall contain the intelligence for reporting address, identity, alarm and trouble to the fire alarm control panel. The manual station communications shall allow the station to provide alarm input to the system and alarm output from the system within less than four (4) seconds.
2. The manual station shall be equipped with terminal strip and pressure style screw terminals for the connection of field wiring. Surface mounted stations were indicated on the drawings shall be mounted using a manufacturer's prescribed matching red enamel outlet box.
3. The double action pull station shall be model number Siga-278
4. Where required, there shall also be available pull stations with break glass, capable of explosion proof installation, capable of weatherproof installation, reset key operation, and metal housings.

F. Addressable Interface Devices

1. Addressable Interface Devices shall be provided to monitor contacts for such items as water-flow, tamper, and PIV switches connected to the fire alarm system. These interface devices shall be able to monitor a single or dual contacts. An address will be provided for each contact. Where remote supervised relay is required, the interface shall be equipped with a SPDT relay rated for 2 amps resistive and 2 amps inductive. The addressable interface modules shall be model number CT1(single input) CT2 (dual input),io(single input, single output)series.
2. Where needed, a Conventional Zone Module shall connect to the Signal Line Circuit, which will allow the use of conventional initiation devices. This module shall have the ability to support up to 16 conventional smoke detectors and an unlimited number of contact devices. This module shall also be capable of monitoring Linear Beam detectors and conventional Flame detectors. The module shall be model #RZ116-2
3. Any field modules required to monitor points outside the building (sprinkler supervisory devices, etc...) shall have surge suppression with proper grounding and cabling installed in accordance with manufacturer's instructions at the point the wiring leaves the building. All underground wiring shall be rated for wet conditions.
4. All addressable interface modules shall be capable of being grouped together without the use of standard electrical boxes, trim rings, mounting plates and covers. The Edwards UIO6/R can accommodate up to six different modules in one electronic circuit board with a single SLC connection, and can be installed in a single, easy to wire cabinet model MFC

2.06 NOTIFICATION APPLIANCES

A. Genesis Series – Strobes, Horns, Horn/Strobes

1. Audible/Visual notification appliances shall be listed for indoor use, and shall meet the requirements of FCC Part 15 - Class B
2. Appliances shall be listed under UL Standard 1971 (Standard for Safety Signaling Devices for Hearing Impaired) and UL Standard 464 (Fire Protective Signaling)
3. Appliances shall use a universal back plate, which shall allow mounting to a single-gang, double-gang, 4-inch-square, 4"-octal, or a 3-1/2"-octal backbox
4. Two-wire appliance wiring shall be capable of directly connecting to the mounting back plate
5. Continuity check shall occur for entire NAC circuit prior to attaching any audible / visual-notification appliances
6. Dust cover shall fit and protect the mounting plate
7. Dust cover shall be easily removed when the appliance is installed over the back plate
8. Removal of an appliance shall result in a trouble condition by the Fire Alarm Control Panel (FACP)
9. Strobe appliances shall produce a minimum flash rate of 60 flashes per minute (1 flash per second) over the Regulated Input Voltage Range, and shall incorporate a Xenon flashtube enclosed in a rugged Lexan® lens
10. Strobes shall be available with two or four field-selectable settings in one unit, and shall be rated – per UL 1971 – for up to:
 - a. 177cd for ceiling and wall mounting
11. Strobes shall operate over an extended temperature range of 32°F to 120°F (0°C to 49°C), and be listed for maximum humidity of 95% RH
12. Strobe inputs shall be polarized for compatibility with standard reverse-polarity supervision of circuit wiring by a Fire Alarm Control Panel (FACP)
13. Audibles and Audible/Strobe Combinations
 - a. Horns and horn / strobes shall be listed for Indoor use under UL Standard 464
 - b. Horns shall be able to produce continuous synchronized output or a temporal code-3 synchronized output
 - c. Horns shall have at least 2 sound-level settings of 90 and 95 dBA
 - d. Synchronization Modules
 - e. The strobe portion, when synchronization is required, shall be compatible with DSC sync modules, FS-250 panel, FireFinder XLS panel, or PAD-3 power supply with built-in sync protocol
14. The strobes shall not drift out of synchronization at any time during operation

15. Audibles and strobes shall be able to synchronize on a 2-wire circuit with the capability to silence the audible, if required
16. Strobes shall revert to a non-synchronized flash-rate, if the sync module or Power Supply should fail to operate (i.e. – contacts remain closed)
17. All notification appliances shall be listed for Special Applications: Strobes are designed to flash at 1-flash-per-second minimum over their “Regulated Input Voltage Range”

2.07 DIGITAL COMMUNICATOR

- A. The Multi-Point Digital Alarm Communicator SA-DACT(POTS Lines) or SA-ETH (Ethernet) shall be UL864 listed to provide point identification of alarm, supervisory, security and trouble events to a Central or Remote Receiving Station. The DACT shall support the following:
 1. Ademco Contact ID or SIA protocol
 2. Ademco Contact ID selection shall provide the ability to transmit events for up to 999 individual zones
 3. SIA selection shall provide the ability to transmit events for up to 10000 individual points
 4. Programming of accounts and phone numbers
 5. Dual phone line interface
 6. Line fault monitoring.
 7. Automatic 24-hour test
 8. The DACT supports configurable alarm, alarm restoral, trouble, trouble restoral, supervisory, supervisory restoral, and reset events.
 9. The DACT supports Ademco Contact ID alarm event codes for general alarm, smoke detector alarm, waterflow alarm, duct alarm, and manual alarm events.
 10. Optionally, the DACT can be programmed to report events by event queue only.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Perform work in accordance with the requirements of NFPA 70, NFPA 72 and NECA 1-2006, Standard of Good Workmanship in Electrical Contracting.

- B. Fasten equipment to structural members of building or metal supports attached to structure, or to concrete surfaces.
- C. Wiring Method: Install fire alarm cables in raceways where exposed or routed thru inaccessible areas. Cables installed in accessible ceiling spaces may be installed on "J" hooks.
- D. All cable runs shall be run at right angles to building walls, supported from structure at intervals not exceeding 3 feet and were installed in environmental air plenums, be rated for such use and tied/supported by components listed for environmental air plenums installation.
- E. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.
- F. Provide primary power for the fire alarm panel as indicated on the Electrical Power Plans. Power shall be 120 VAC service, transformed through a two-winding, isolation type transformer and rectified to low voltage DC for operation of all circuits and devices.

3.03 BOXES, ENCLOSURES AND WIRING DEVICES

- A. Boxes shall be installed plumb and firmly in position.
- B. Extension rings with blank covers shall be installed on junction boxes where required.
- C. Junction boxes served by concealed conduit shall be flush mounted.
- D. Upon initial installation, all wiring outlets, junction, pull and outlet boxes shall have dust covers installed. Dust covers shall not be removed until wiring installation when permanent dust covers or devices are installed.
- E. "Fire alarm system" decal or silk-screened label shall be applied to all fire alarm system junction box covers.

3.04 CONDUCTORS

- A. Each conductor shall be identified as shown on the fire alarm vendor's installation drawings at each with wire markers at terminal points. Attach permanent wire markers within 2 inches of the wire termination. Marker legends shall be visible.
- B. All wiring shall be supplied and installed in compliance with the requirements of the National Electric Code, NFPA 70, Article 760, and that of the manufacturer.
- C. Wiring for strobe and audible circuits shall be a minimum 14 AWG, signal line circuits minimum 18 AWG twisted.
- D. All splices shall be made using solder-less connectors. All connectors shall be installed in conformance with the manufacturer recommendations.
- E. Crimp-on type spade lugs shall be used for terminations of stranded conductors to binder screw or stud type terminals. Spade lugs shall have upset legs and insulation sleeves sized for the conductors.
- F. The installation contractor shall submit for approval prior to installation of wire, a proposed color code for system conductors to allow rapid identification of circuit types.

- G. Wiring within sub panels shall be arranged and routed to allow accessibility to equipment for adjustment and maintenance.

3.05 DEVICES

- A. Relays and other devices to be mounted in auxiliary panels are to be securely fastened to avoid false indications and failures due to shock or vibration.
- B. Wiring within panels shall be arranged and routed to allow accessibility to equipment for adjustment and maintenance.
- C. All devices and appliances shall be mounted to or in an approved electrical box.

3.06 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- B. Permanently label or mark each conductor at both ends with permanent alphanumeric wire markers.
- C. A consistent color code for fire alarm system conductors throughout the installation.

3.07 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: The installing electrical contractor shall engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Testing General:
 - 1. All Alarm Initiating Devices shall be observed and logged for correct zone and sensitivity. These devices and their bases shall be tagged with adhesive tags located in an area not visible when installed, showing the initials of the installing technician and date.
 - 2. Wiring runs shall be tested for continuity, short circuits and grounds before system is energized. Resistance, current and voltage readings shall be made as work progresses.
 - 3. The fire alarm acceptance inspector shall be notified before the start of the required tests. All items found at variance with the drawings or this specification during testing or inspection by the acceptance inspector shall be corrected.
 - 4. Test reports shall be delivered to the acceptance inspector as completed.
 - 5. All test equipment, instruments, tools and labor required to conduct the system tests shall be made available by the installing contractor. The following equipment shall be a minimum for conducting the tests:
 - a. Ladders and scaffolds as required to access all installed equipment.
 - b. Multi-meter for reading voltage, current and resistance.
 - c. Two-way radios and flashlights.

- d. A manufacturer recommended device for measuring air flow through air duct smoke detector sampling assemblies.
- e. Decibel meter.
- f. In addition to the testing specified above to be performed by the installing contractor, the installation shall be subject to test by the acceptance inspector.

3.08 ACCEPTANCE TESTING

- A. A written acceptance test procedure (ATP) for testing the fire alarm system components and installation will be prepared by the engineer in accordance with NFPA 72 and this specification. The contractor shall be responsible for the performance of the ATP, demonstrating the function of the system and verifying the correct operation of all system components, circuits, and programming.
- B. A program matrix shall be prepared by the installing contractor referencing each alarm input to every output function affected as a result of an alarm condition on that input.
- C. The installing contractor prior to the ATP shall prepare a complete listing of all device labels for alphanumeric annunciator displays.
- D. Preliminary Testing: Conduct preliminary tests to ensure that all devices and circuits are functioning properly. After preliminary testing is complete, provide a letter certifying that the installation is complete and fully operable. The letter shall state that each initiating and indicating device was tested in place and functioned properly. The letter shall also state that all panel functions were tested and operated properly. The Contractor and an authorized representative from each supplier of equipment shall attend the preliminary testing to make necessary adjustments.
- E. Final Acceptance Test: Notify the owner in writing when the system is ready for final acceptance testing. Submit request for test at least 14 calendar days prior to the test date. A final acceptance test will not be scheduled until meggar test results, and the submittals required in Part 1 are provided to the owner. Test the system in accordance with the procedures outlined in NFPA 72.
 - 1. Verify that the control unit is in the normal condition as detailed in the manufacturer's operating and maintenance manual.
 - 2. Test each initiating and indicating device and circuit for proper operation and response. Disconnect the confirmation feature for smoke detectors during tests to minimize the amount of smoke or test gas needed to activate the detector.
 - 3. Test the system for all specified functions in accordance with the contract drawings and specifications and the manufacturer's operating and maintenance manual.
 - 4. Visually inspect all wiring.
 - 5. Verify that all software control and data files have been entered or programmed into the FACP.
 - 6. Verify that Shop Drawings reflecting as-built conditions are accurate.

7. Measure the current in circuits to assure that there is the calculated spare capacity for the circuits.
 8. Measure voltage readings for circuits to assure that voltage drop is not excessive.
- F. The acceptance inspector shall use the system record drawings in combination with the documents specified in this specification during the testing procedure to verify operation as programmed. In conducting the ATP, the acceptance inspector shall request demonstration of any or all input and output functions. The items tested shall include but not be limited to the following:
1. System wiring shall be tested to demonstrate correct system response and correct subsequent system operation in the event of:
 - a. Open, shorted and grounded signal line circuits.
 - b. Open, shorted and grounded notification, releasing circuits.
 - c. Primary power or battery disconnected.
 2. System notification appliances shall be demonstrated as follows:
 - a. All alarm notification appliances actuate as programmed
 - b. Audibility and visibility at required levels.
 3. System indications shall be demonstrated as follows:
 - a. Correct message display for each alarm input at the control display.
 - b. Correct annunciator light for each alarm input at each annunciator and graphic display as shown on the drawings.
 - c. Correct history logging for all system activity.
 4. System off-site reporting functions shall be demonstrated as follows:
 - a. Correct zone transmitted for each alarm input
 - b. Trouble signals received for disconnect
 5. Secondary power capabilities shall be demonstrated as follows:
 - a. System primary power shall be disconnected for a period of time as specified herein. At the end of that period, an alarm condition shall be created and the system shall perform as specified for a period as specified.
 - b. System primary power shall be restored for forty-eight hours, and system-charging current shall be normal trickle charge for a fully charged battery bank.
 - c. System battery voltages and charging currents shall be checked at the fire alarm control panel.

3.09 DOCUMENTATION

- A. System documentation shall be furnished to the owner and shall include but not be limited to the following:
 - 1. System record construction drawings and wiring details including one set of reproducible drawings, and a CD ROM with copies of the record drawings in DXF format for use in a CAD drafting program.
 - 2. PDF copy of fire alarm vendor's submittal of installation drawings and shop drawings with documentation indicating review and approval of the system by the Commonwealth of Kentucky's Fire Marshall's office.
 - 3. System operation, installation and maintenance manuals.
 - 4. System matrix showing interaction of all input signals with output commands.
 - 5. Documentation of system voltage, current and resistance readings taken during the installation, testing and ATP phases of the system installation.
 - 6. System program showing system functions, controls and labeling of equipment and devices.

3.10 PROTECTION

- A. Remove and replace devices and panel components that are wet, moisture damaged, or mold damaged.

3.11 DEMONSTRATION

- A. Instructor: Include in the project the services of an instructor, who shall have received specific training from the manufacturer for the training of other persons regarding the inspection, testing and maintenance of the system provided. The instructor shall train the employees designated by the owner, in the care, adjustment, maintenance, and operation of the fire alarm system.
- B. Training sessions shall cover all aspects of system performance, including system architecture, signaling line circuit configurations, sensor and other initiating device types, locations, and addresses, fire alarm control panel function key operation, and other functions as designated by the owner.
- C. Required Instruction Time: Provide 8 hours of instruction after final acceptance of the system. The instruction shall be given during regular working hours on such dates and times as are selected by the owner. The instruction may be divided into two or more periods at the discretion of the owner.
- D. Provide a typeset printed or typewritten instruction card mounted behind a Lexan plastic or glass cover in a stainless steel or aluminum frame. Install the frame in a conspicuous location observable from the FACP. The card shall show those steps to be taken by an operator when a signal is received as well as the functional operation of the system under all conditions, normal, alarm, supervisory and trouble. The instructions shall be approved by the owner.
- E. All training sessions shall be conducted by an authorized fire alarm system distributor representative, who has received specific training from the manufacturer for the training of other persons regarding the inspection, testing, and maintenance of the system provided.

END OF SECTION