

PROJECT MANUAL
FOR

AG-SCIENCE & RESEARCH FARM-2017

SEYMOUR HIGH SCHOOL

SEYMOUR COMMUNITY SCHOOLS
Seymour, Indiana



KovertHawkins
architects

PROJECT MANUAL
FOR

AG-SCIENCE & RESEARCH FARM-2017
SEYMOUR HIGH SCHOOL

721 F AVENUE, FREEMAN FIELD
SEYMOUR, INDIANA 47274

SEYMOUR COMMUNITY SCHOOLS
Seymour, Indiana

KOVERT HAWKINS ARCHITECTS, INC.

630 Walnut Street

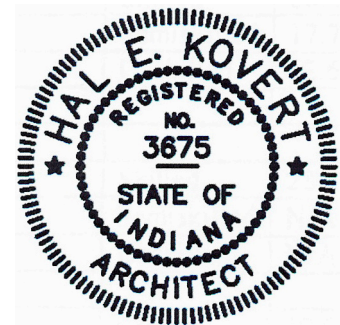
Jeffersonville, IN 47130

Phone 812.282.9554

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web: www.koverthawkins.com



A handwritten signature in blue ink, appearing to read "H. E. Kovert".

Date: July 28, 2016
File: 201582.01

Hal E. Kovert, AIA
State Registration Number AR00033675

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END OF INDEX

SECTION 00100 - NOTICE TO BIDDERS

Notice is hereby given that sealed proposals will be received:

BY: Seymour Community Schools
1638 South Walnut Street
Seymour, IN 47274

FOR: Ag-Science & Research Farm - 2017
Seymour High School
721 F Avenue, Freeman Field
Seymour, Indiana 47274

AT: Seymour Community Schools Central Office
1638 South Walnut Street
Seymour, IN 47274

UNTIL: 2:00 PM (EDT), (Seymour local time)

DATE: September 1, 2016 (EDST), (Seymour Local Time)

At which time all proposals will be opened and publicly read aloud. Proposals received after the hour and date set for receiving of proposals, will be returned unopened.

All work will be awarded under a single General Contract.

Proposals shall be executed on the Contractor's Bid for Public Works, Form 96 (Revised 2013), Parts I and II, in full accordance with the Proposal Documents, which are on file with the Owner and Architect and may be examined by Bidders at the following locations:

Seymour Community Schools
1638 South Walnut Street
Seymour, IN 47274
812-522-3340 p

Kovert Hawkins Architects, Inc.
630 Walnut Street
Jeffersonville, IN 47130
812-282-9554 p

PRE-BID CONFERENCE

DATE: Thursday, August 18, 2016
TIME: 11:00 A.M. Local Time
LOCATION: Seymour Community Schools Central Office
1638 South Walnut Street, Seymour, IN 47274

All bidders and plan services will have free access to a complete electronic set of Drawings and Specifications. All bid documents may be downloaded free of charge in electronic PDF format for viewing, printing and distribution to bidders, sub-bidders, suppliers, and reprographics services at the discretion and responsibility of the General Contractors. Bidders shall complete the Plan Holder List form via www.koverthawkins.com/bid-information. Upon completion of the form, bidders will be re-directed to the Project Page where all bid information may be downloaded. Bidders should bookmark this link and www.koverthawkins.com/bid-information for future access. A list of updated Plan Holders and Addenda will periodically be posted and made available for download.

The Architect retains all copyright to the bid documents, as instruments of their professional service. Bidders, or any other persons, may not use the PDF files for any other purpose than preparing a bid for this project.

All General Contractors planning to submit a bid for this project are required to be Registered Plan Holders. Registered Plan Holders are only those who complete the Plan Holder List form via the Architect's website as indicated above. Addenda and any other additional information will be emailed only to these registered plan holders (using the address provided on the Plan Holder List form) as they become available. Bidders obtaining partial copies of the bid documents from any other source are not Registered Plan Holders and will not be automatically provided with Addenda or other bidding updates as prepared by the Architect. Non-Registered Plan Holders assume all responsibility for obtaining all necessary information in a timely manner.

For convenience of the bidders, complete electronic files will also be sent to the following reprographic services. Bidders are responsible for costs of any desired printing of drawings and/or specifications directly from these reprographics services at cost of printing plus any shipping and handling charges.

Don Meredith Company
2434a Crittenden Drive
Louisville, KY 40217
502-636-0155 p
donm@donmeredith.com
www.dmcplanroom.com

General Contractors shall certify on the Proposal Form that they have obtained a complete set of construction documents, including all Drawings, Specifications and Addenda, and have reviewed the jobsite to sufficiently familiarize themselves with the existing conditions.

All questions and requests for substitutions shall be directed to:

Hal E. Kovert, AIA
Kovert Hawkins Architects, Inc.
hal.kovert@koverthawkins.com

Bid Security in the amount of five percent (5%) of the Proposal, including all add alternates must accompany each Proposal in accordance with the Instructions to Bidders.

The Owner reserves the right to accept or reject any bid and to waive any irregularities in bidding. The Base Bid may be held for a period not to exceed Forty-Five (45) days before awarding Contracts. All additive Alternate Bids may be held for a period not to exceed Thirty (30) days after signing of Contract.

Should a successful Bidder withdraw his bid, or fail to execute a satisfactory contract within ten (10) days after notice of acceptance of his bid, the Owner may declare the Bid Security forfeited as liquidated damages, not as penalty.

The successful Bidder shall furnish a Performance Bond and Labor and Materials Payment Bond in an amount equal to one hundred percent (100%) of the Contract Sum with an approved surety company and said bond shall remain in full force and effect for a period of one (1) year after date of final acceptance of the work. The cost of all bonds shall be included in the bid price.

SEYMOUR COMMUNITY SCHOOLS
JULY 28, 2016

END OF SECTION 00100



AIA[®]

Document A701™ – 1997

Instructions to Bidders

for the following PROJECT:

(Name and location or address)

Seymour High School
AG-Science & Research Farm-2017
721 F Avenue, Freeman Field
Seymour, Indiana

THE OWNER:

(Name, legal status and address)

Seymour Community Schools
1638 South Walnut Street
Seymour, IN 47274

THE ARCHITECT:

(Name, legal status and address)

Kovert Hawkins Architects, Inc.
630 Walnut Street
Jeffersonville IN 47130

ADDITIONS AND DELETIONS:

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

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

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ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the proposed Contract Documents. The Bidding Requirements consist of the Advertisement or Invitation to Bid, Instructions to Bidders, Supplementary Instructions to Bidders, the bid form, and other sample bidding and contract forms. The proposed Contract Documents consist of the form of Agreement between the Owner and Contractor, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications and all Addenda issued prior to execution of the Contract.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201, or in other Contract Documents are applicable to the Bidding Documents.

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

§ 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 as the base, to which Work may be added or from which Work may be deleted for 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 the amount of 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 The Bidder by making a Bid represents that:

§ 2.1.1 The Bidder has read and understands the Bidding Documents or Contract Documents, to the extent that such documentation relates to the Work for which the Bid is submitted, and for other portions of the Project, if any, being bid concurrently or presently under construction.

§ 2.1.2 The Bid is made in compliance with the Bidding Documents.

§ 2.1.3 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 personal observations with the requirements of the proposed Contract Documents.

§ 2.1.4 The Bid is based upon the materials, equipment and systems required by the Bidding Documents without exception.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 COPIES

§ 3.1.1 Bidders may obtain complete sets of the Bidding Documents from the issuing office designated in the Advertisement or Invitation to Bid in the number and for the deposit sum, if any, stated therein. The deposit will be refunded to Bidders who submit a bona fide Bid and return the Bidding Documents in good condition within ten days after receipt of Bids. The cost of replacement of missing or damaged documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the Bidding Documents and the Bidder's deposit will be refunded.

§ 3.1.2 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the Advertisement or Invitation to Bid, or in supplementary instructions to bidders.

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

§ 3.1.4 The Owner and Architect may make copies of the Bidding Documents available on the above terms for the purpose of obtaining Bids on the Work. No license or grant of use is conferred by issuance of copies of the Bidding Documents.

§ 3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

§ 3.2.1 The Bidder shall carefully study and compare the Bidding Documents with each other, and with other work being bid concurrently or presently under construction to the extent that it relates to the Work for which the Bid is submitted, shall examine the site and local conditions, and shall at once report to the Architect errors, inconsistencies or ambiguities discovered.

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

§ 3.2.3 Interpretations, corrections and changes of the Bidding Documents will be made by Addendum. Interpretations, corrections and changes of the Bidding Documents made in any other manner will 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 No substitution will be considered prior to receipt of Bids unless written request for approval has been received by the Architect at least ten days prior to the date for receipt of Bids. Such requests shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. A statement setting forth changes in other materials, equipment or other portions of the Work, including changes in the work of other contracts that incorporation of the proposed substitution would require, shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

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

§ 3.3.4 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 all who are known by the issuing office to have received a complete set of Bidding Documents.

§ 3.4.2 Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.

§ 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 Each Bidder shall ascertain prior to submitting a Bid 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 the Bidding Documents.

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

§ 4.1.3 Sums shall be expressed in both words and figures. In case of discrepancy, the amount written in words shall govern.

§ 4.1.4 Interlineations, alterations and erasures 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."

§ 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 make no 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 of the Bidder and the nature of legal form of the Bidder. The Bidder shall provide evidence of legal authority to perform within the jurisdiction of the Work. Each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Bidder.

§ 4.2 BID SECURITY

§ 4.2.1 Each Bid shall be accompanied by a bid security in the form and amount required if so stipulated in the Instructions to Bidders. The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and will, 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. The amount of the bid security shall not be forfeited to the Owner in the event the Owner fails to comply with Section 6.2.

§ 4.2.2 If a surety bond is required, it shall be written on AIA Document A310, Bid Bond, unless otherwise provided in the Bidding Documents, and the attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of the power of attorney.

§ 4.2.3 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until either (a) the Contract has been executed and bonds, if required, have been furnished, or (b) the specified time has elapsed so that Bids may be withdrawn or (c) all Bids have been rejected.

§ 4.3 SUBMISSION OF BIDS

§ 4.3.1 All copies of the Bid, the bid security, if any, 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.

§ 4.3.2 Bids shall be deposited at the designated location prior to the time and date for receipt of Bids. Bids received after the time and date for receipt of Bids will be returned unopened.

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

§ 4.3.4 Oral, telephonic, telegraphic, facsimile or other electronically transmitted bids will not be considered.

§ 4.4 MODIFICATION OR WITHDRAWAL OF BID

§ 4.4.1 A Bid may not be modified, withdrawn or canceled by the Bidder during the stipulated time period following the time and date designated for the receipt of Bids, and each Bidder so agrees in submitting a Bid.

§ 4.4.2 Prior to the time and date designated for receipt of Bids, a Bid submitted may be modified or withdrawn by notice to the party receiving Bids at the place designated for receipt of Bids. Such notice shall be in writing over the signature of the Bidder. Written confirmation over the signature of the Bidder shall be received, and date- and time-stamped by the receiving party on or before the date and time set for receipt of Bids. A change shall be so worded as not to reveal the amount of the original Bid.

§ 4.4.3 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids provided that they are then fully in conformance with these Instructions to Bidders.

§ 4.4.4 Bid security, if required, shall be in an amount sufficient for the Bid as resubmitted.

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 OPENING OF BIDS

At the discretion of the Owner, if stipulated in the Advertisement or Invitation to Bid, the properly identified Bids received on time will be publicly opened and will be read aloud. An abstract of the Bids may be made available to Bidders.

§ 5.2 REJECTION OF BIDS

The Owner shall have the right to reject any or all Bids. A Bid not accompanied by a required bid security or by other data required by the Bidding Documents, or a Bid which is in any way incomplete or irregular is subject to rejection.

§ 5.3 ACCEPTANCE OF BID (AWARD)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest qualified Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. The Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's own best interests.

§ 5.3.2 The Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the low 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, a properly executed AIA Document A305, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted as a prerequisite to the issuance of Bidding Documents.

§ 6.2 OWNER'S FINANCIAL CAPABILITY

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

§ 6.3 SUBMITTALS

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

- .1 a designation of the Work to be performed with the Bidder's own forces;
- .2 names of the manufacturers, products, and the suppliers of principal items or systems of materials and equipment proposed for the Work; 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 in writing 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, (1) withdraw the Bid or (2) submit an acceptable substitute person or entity with an adjustment in the Base Bid or Alternate Bid to cover 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. Bonds may be secured through the Bidder's usual sources.

§ 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 If the Owner requires that bonds be secured from other than the Bidder's usual sources, changes in cost will be adjusted as provided in the Contract Documents.

§ 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 be commenced prior thereto 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. Both bonds shall be written in the amount of the Contract Sum.

§ 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 thereto a certified and current copy of the power of attorney.

ARTICLE 8 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

Unless otherwise required in the Bidding Documents, the Agreement for the Work will be written on AIA Document A101, Standard Form of Agreement Between Owner and Contractor Where the Basis of Payment Is a Stipulated Sum.

SECTION 00210 - SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

The following supplements modify the Instructions to Bidders, AIA Document A701 - 1997, entitled "Instructions to Bidders". Where a portion of the Instruction to Bidders is modified or deleted by these Supplementary Instructions, the unaltered portions of the Instructions To Bidders shall remain in effect.

ARTICLE 9 - SUPPLEMENTARY INSTRUCTIONS

- 9.1 Article 3 - BIDDING DOCUMENTS, delete the current Paragraph and replace with the following:
3.1.1 All bid documents may be downloaded free of charge in PDF format for viewing, printing and distribution to bidders, sub-bidders and suppliers at the discretion and responsibility of the general contractors. All information is posted on a website identified in the Notice To Bidders or available by contacting the Architect. The Architect retains all copyright to all Bid Documents. Bidders may not use the Bid Documents for any purpose except preparing a bid for this project. Bidders may not distribute Bid Documents to Plan Room services, either electronic or hard copy, without the express written permission of the Architect. Printing of bid documents, including all costs associated therewith, is to be borne by the bidders.
- 9.2 Article 3 - BIDDING DOCUMENTS, delete the current Paragraph and replace with the following:
3.1.2 Bid documents are available to sub-bidders in accordance with Paragraph 3.1.1.
- 9.3 Article 3 - BIDDING DOCUMENTS, add the following Paragraph:
3.1.5 In the event of any discrepancy between electronic versions and any hard copy, printed versions of the files, the hard copy version on file at the Architect's office will govern.
- 9.4 Article 3 - BIDDING DOCUMENTS, add the following Paragraph:
3.3.5 When specifications include a list of acceptable manufacturers, it is done for the express purpose of establishing a basis of durability, efficiency, configuration, maintain Owner's maintenance stock, and not for the purpose of limiting competition. These said names establish the products on which the bidder's proposal shall be based for that particular specification item. Proposed substitutions must be submitted in accordance with Specification Section 01630-Product Options and Substitutions.
- 9.5 Article 3 - BIDDING DOCUMENTS, delete Paragraph 3.4.3.
- 9.6 Bidder shall submit financial statement demonstrating financial capability to complete project, as required by the Proposal Form.
- 9.7 Bidder shall submit two (2) copies of all required Bidding Documents.
- 9.8 All bidders shall submit Contractor's Bid For Public Works-Form 96, Part I and Part II (Revised 2010), as required by the Proposal Form.
- 9.9 Bidders are required to include unit prices on added or deleted work as listed on the Contractor's Bid Form.
- 9.10 Minimum wage rates are not required and have not been established for this project.
- 9.11 Article 7 – PERFORMANCE BOND AND PAYMENT BOND.
Under Section 7.1.1, delete the words "If stipulated in the Bidding Documents, the" and substitute the word "The".
Under Section 7.1.1, add the following sentence: "The costs for all Bonds must be included in the bid price."

Delete Section 7.1.2 in its entirety.

SEYMOUR HIGH SCHOOL
AG-SCIENCE & RESEARCH FARM-2017

1582.01
07/28/16

9.12 Materials supplied for this project are exempt from Indiana State Sales Tax. Products purchased from sources outside the State of Indiana may require payment of sales tax to that particular jurisdiction. All costs for such tax will be the responsibility of the Contractor.

9.13 Electronic submissions of bids are NOT acceptable. This includes fax and e-mail.

END OF SECTION 00210

SECTION 00300 – CONTRACTOR’S BID FORM: PUBLIC WORKS

1.01 PROJECT MANUAL

A. All requirements of the Project Manual shall apply to this Section.

1.02 SCOPE

A. Contractor’s Bid Form shall be Contractor’s Bid For Public Works-Form 96 (Revised 2013), as modified and as included in Section 00301 and Section 00302.

1. Part I of Form 96 must be completed as required by statutes.
2. Part II of Form 96 must be completed as required by statutes only if project is one hundred thousand dollars (\$100,000) or more (IC 36-1-12-4).
3. Proposal form shall be submitted in duplicate (one signed original and one copy).
4. Forms to be reproductions of those included in Project Manual.
5. Contractor may bid each, any, or all separate contracts listed.

B. The executed Proposal Form and Non-Collusion Affidavit will become a part of the successful Bidder’s Contract Documents.

END OF SECTION 00300

PROPOSAL FORM: PART I
Form 96 (Revised 2013)

CONTRACTOR'S BID FOR PUBLIC WORKS

Prescribed by the State Board of Accounts

CONTRACTORS BID FOR: Ag-Science & Research Farm
 Seymour High School
 721 F Avenue, Freeman Field
 Seymour, Indiana 47274

PART I (Part I to be completed for all bids)

Date (Month, Day, Year): _____

Governmental Unit (Owner): SEYMOUR COMMUNITY SCHOOLS

County: _____

Bidder (Firm): _____

Address: _____

City, State, ZIP code: _____

Telephone Number: _____

E-Mail Address: _____

Agent of Bidder: _____
(if applicable)

Pursuant to notices given, the undersigned offers to furnish labor and/or material necessary to complete the public works project of Seymour Community Schools (Governmental Unit) in accordance with plans and specifications prepared by Kovert Hawkins Architects, Inc. and their consultants and dated May 04, 2016 for the sum of:

BASE BID

Lump Sum _____ \$ _____

The undersigned further agrees to furnish a bond or certified check with this bid for an amount specified in the notice of the letting. If alternative bids apply, the undersigned submits a proposal for each in accordance with the notice.

ADDENDA

Acknowledges receipt of:

Addendum No. _____ () pages Dated _____

Addendum No. _____ () pages Dated _____

Addendum No. _____ () pages Dated _____

Addendum No. _____ () pages Dated _____

ALTERNATES

The undersigned also proposes to furnish or to omit all labor and materials necessary to complete work as required by the Alternate Bids, as provided in the specifications as follows:

Alternate No. 1A: HVAC Controls I-Johnson Controls	ADD	\$ _____
Alternate No. 1B: HVAC Controls -Trane Controls	ADD	\$ _____
Alternate No. 1C: HVAC Controls –Approved Substitutions	ADD	\$ _____
Alternate No. 2: Welding Stations 5-6-7-8-9-10	ADD	\$ _____
Alternate No. 3: Ceiling Fans	ADD	\$ _____
Alternate No. 4: Kitchen Equipment	ADD	\$ _____
Alternate No. 5: Kitchen Exhaust Hood	ADD	\$ _____
Alternate No. 6: Lab Casework	ADD	\$ _____
Alternate No. 7: Epoxy Floor Coating	ADD	\$ _____
Alternate No. 8: Asphalt Pavement	ADD	\$ _____
Alternate No. 9A: DeBourgh Lockers	ADD	\$ _____
Alternate No. 9B: Alternate Approved Lockers	ADD	\$ _____
Alternate No. 10: Exterior Precast Painting	ADD	\$ _____

ALLOWANCES

By initialing adjacent to amounts below, the bidder acknowledges the allowance amounts are included in the forgoing bid:

Contingency Allowance within the **Base Bid** per Section 01220 **\$ 50,000** initials _____

COMPLETION OF WORK

Undersigned guarantees, if awarded contract, to complete the work by August 1, 2017

DISCRIMINATION

The Contractor and his subcontractors, if any, shall not discriminate against or intimidate any employee, or applicant for employment, to be employed in the performance of this contract, with respect to any matter directly or indirectly related to employment because of race, religion, color, sex, national origin or ancestry. Breach of this covenant may be regarded as a material breach of the Contract.

CERTIFICATION OF USE OF UNITED STATES STEEL PRODUCTS (if applicable)

I, the undersigned bidder or agent as a contractor on a public works project, understand my statutory obligation to use steel products made in the United States (I.C. 5-16-8-2). I hereby certify that I and all subcontractors employed by me for this project will use U.S. steel products on this project if awarded. I understand that violations hereunder may result in forfeiture of contractual payments.

NON-COLLUSION AFFIDAVIT

The undersigned bidder or agent, being duly sworn on oath, says that he has not, nor has any other member, representative, or agent of the firm, company, corporation or partnership represented by him, entered into any combination, collusion or agreement with any person relative to the price to be bid by anyone at such letting nor to prevent any person from bidding nor to induce anyone to refrain from bidding, and that this bid is made without reference to any other bid and without any agreement, understanding or combination with any other person in reference to such bidding.

He further says that no person or persons, firms, or corporation has, have or will receive directly or indirectly, any rebate, fee, gift, commission or thing of value on account of such sale.

GENERAL CONTRACTOR CERTIFICATION

I hereby certify that we have obtained a complete set of construction documents, including all Drawings, Specifications and Addenda, and have reviewed the jobsite to sufficiently familiarize ourselves with the existing conditions.

Dated at _____ this _____ day of _____, 20____.

(Name of Organization)

BY _____

(Title of Person Signing)

OATH AND AFFIRMATION

I hereby affirm under the penalties for perjury that the facts and information contained in the foregoing bid for public works are true and correct.

Dated at _____ this _____ day of _____, 20____.

(Name of Organization)

BY _____

(Title of Person Signing)

ACKNOWLEDGEMENT

STATE OF _____

COUNTY OF _____

Before me, a Notary Public, personally appeared the above-named _____ and
(Name of Person Signing)
swore that the statements contained in the foregoing document are true and correct.

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

Notary Public

My Commission Expires: _____

County of Residence: _____

ACCEPTANCE

The above bid is accepted this _____ day of _____, 20____,

subject to the following conditions: _____

Contracting Authority Members:

END OF SECTION 00301

PROPOSAL FORM: PART II
Form 96 (Revised 2010)

CONTRACTOR'S BID FOR PUBLIC WORKS
Prescribed by the State Board of Accounts

Part II

(Part II to be completed only if project is \$100,000 or more - IC 36-1-12-4).

Governmental Unit: SEYMOUR COMMUNITY SCHOOLS

Bidder (Firm): _____

Date: _____

These statements to be submitted under oath by each bidder with and as a part of his bid.
Attach additional pages for each section as needed.

SECTION I: EXPERIENCE QUESTIONNAIRE

1. What public works projects has your organization completed for the period of one (1) year prior to the date of the current bid?

Contract Amount	Class of Work	Completion Date	Name and Address of Owner
-----------------	---------------	-----------------	---------------------------

2. What public works projects are now in process of construction by your organization?

Contract Amount	Class of Work	Expected Completion Date	Name and Address of Owner
-----------------	---------------	--------------------------	---------------------------

3. Have you ever failed to complete any work awarded to you? _____ If so, where and why?

4. List references from private firms for which you have performed work.

SECTION II: PLAN AND EQUIPMENT QUESTIONNAIRE

1. Explain your plan or layout for performing proposed work.

2. Please list the names and addresses of all subcontractors that you have used on public works projects during the past five (5) years along with a brief description of the work done by each subcontractor.

3. If you intend to sublet any portion of the work, state the name and address of each subcontractor, equipment to be used by the subcontractor, and whether you will require a bond. However, if you are unable to currently provide a listing, please understand a listing must be provided prior to contract approval. Until the completion of the proposed project, you are under a continuing obligation to immediately notify the governmental unit in the event that you subsequently determine that you will use a subcontractor on the proposed project.

4. What equipment do you have available to use for the proposed project?
Any equipment to be used by subcontractors may also be required to be listed by the governmental unit.

5. Have you entered into contracts or received offers for all materials which substantiate the prices used in preparing your proposal? If not, please explain the rationale used which would corroborate the prices listed.

SECTION III: CONTRACTOR'S FINANCIAL STATEMENT

Attachment of bidder's financial statement is mandatory. Any bid submitted without said financial statement as required by statute shall thereby be rendered invalid. The financial statement provided hereunder to the governing body awarding the contract must be specific enough in detail so that said governing body can make a proper determination of the bidder's capability for completing the project if awarded.

SECTION IV: NON-COLLUSION AFFIDAVIT

The undersigned bidder or agent, being duly sworn on oath, says that he has not, nor has any other member, representative, or agent of the firm, company, corporation or partnership represented by him, entered into any combination, collusion or agreement with any person relative to the price to be bid by anyone at such letting nor to prevent any person from bidding nor to induce anyone to refrain from bidding, and that this bid is made without reference to any other bid and without any agreement, understanding or combination with any other person in reference to such bidding.

He further says that no person or persons, firms, or corporation has, have or will receive directly or indirectly, any rebate, fee, gift, commission or thing of value on account of such sale.

SECTION V: OATH AND AFFIRMATION

I hereby affirm under the penalties for perjury that the facts and information contained in the foregoing bid for public works are true and correct.

Dated at _____ this _____ day of _____, 20____.

(Name of Organization)

BY _____

(Title of Person Signing)

ACKNOWLEDGEMENT

STATE OF _____

COUNTY OF _____

Before me, a Notary Public, personally appeared the above-named _____ and
(Name of Person Signing)
swore that the statements contained in the foregoing document are true and correct.

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

Notary Public

My Commission Expires: _____

County of Residence: _____

END OF SECTION 00302

SECTION 00410 - BID SECURITY FORM

1.01 PROJECT MANUAL

All requirements of the Project Manual shall apply to this Section.

1.02 SCOPE

A. Contractors Bid Security shall be either:

1. Bid Bond.
2. Certified Check.
3. Cashier's Check.

B. The Bid Bond, if used, shall be AIA Document A310 - 2010, entitled "Bid Bond".

1. Bond shall be by an acceptable Surety Company licensed to do business in the State of **Indiana**.
2. A copy of this form is bound herewith.

C. Bid Security shall be:

1. In an amount equal to five (5) percent of the total lump sum base bid plus (5) percent of all add alternates.
2. Security shall be executed in favor of the Owner.
3. Should the successful Bidder fail to enter into a contract or furnish the required Bonds within ten (10) days from date of notice of award, the Owner may declare the Bidder's Bid Security forfeited and the Security amount retained by the Owner as liquidated damages.

END OF SECTION 00410



Document A310™ – 2010

Bid Bond

CONTRACTOR:

(Name, legal status and address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status and address)

Seymour Community Schools
1638 South Walnut Street
Seymour, IN 47274

BOND AMOUNT: \$

PROJECT:

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

Seymour High School
AG-Science & Research Farm-2017
721 F Avenue, Freeman Field
Seymour, Indiana

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

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

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so

ADDITIONS AND DELETIONS:

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

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

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

Init.

furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

Signed and sealed this day of ,

_____ (Contractor as Principal) (Seal)

_____ (Witness)

_____ (Title)

_____ (Surety) (Seal)

_____ (Witness)

_____ (Title)

SECTION 00500 - AGREEMENT FORM

1.01 PROJECT MANUAL

All requirements of the Project Manual shall apply to this Section.

1.02 SCOPE

A. The agreement shall be AIA Document A101 - 2007, entitled "Standard Form of Agreement Between Owner and Contractor".

1. Where the basis of payment is a stipulated sum.
2. Copy of this form is bound herewith.

B. This form, when fully executed, becomes a part of the successful Bidder's Contract Documents.

END OF SECTION 00500



AIA[®]

Document A101[™] – 2007

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

AGREEMENT made as of the Twenty-second day of December in the year Two Thousand Fifteen

(In words, indicate day, month and year.)

BETWEEN the Owner:

(Name, legal status, address and other information)

Seymour Community Schools
1638 South Walnut Street
Seymour, IN 47274
Telephone Number: 812.522.3340
Fax Number: 812.522.8031

and the Contractor:

(Name, legal status, address and other information)

for the following Project:

(Name, location and detailed description)

Seymour High School
AG-Science & Research Farm-2017
721 F Avenue, Freeman Field
Seymour, Indiana

The Architect:

(Name, legal status, address and other information)

Kovert Hawkins Architects, Inc.
630 Walnut Street
Jeffersonville IN 47130
Telephone Number: 812.282.9554
Fax Number: 812.282.9171

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS:

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

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

AIA Document A201[™]-2007, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

TABLE OF ARTICLES

1	THE CONTRACT DOCUMENTS
2	THE WORK OF THIS CONTRACT
3	DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
4	CONTRACT SUM
5	PAYMENTS
6	DISPUTE RESOLUTION
7	TERMINATION OR SUSPENSION
8	MISCELLANEOUS PROVISIONS
9	ENUMERATION OF CONTRACT DOCUMENTS
10	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 the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.

(Insert the date of commencement if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

If, prior to the commencement of the Work, the Owner requires time to file mortgages and other security interests, the Owner's time requirement shall be as follows:

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

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than () days from the date of commencement, or as follows:

(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

Init.

Portion of Work

Substantial Completion Date

, subject to adjustments of this Contract Time as provided in the Contract Documents.
(Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)

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 One Hundred Forty-six Thousand Dollars and Zero Cents (\$ 146,000.00), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

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

Item	Units and Limitations	Price Per Unit (\$0.00)
------	-----------------------	-------------------------

§ 4.4 Allowances included in the Contract Sum, if any:
(Identify allowance and state exclusions, if any, from the allowance price.)

Item	Price
------	-------

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 certified amount 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 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, unless objected to by the Architect, 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 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

- .1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of percent (%). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™–2007, General Conditions of the Contract for Construction;
- .2 Add 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), less retainage of percent (%);
- .3 Subtract the aggregate of previous payments made by the Owner; and
- .4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201–2007.

§ 5.1.7 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

- .1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and
(Section 9.8.5 of AIA Document A201–2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)
- .2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201–2007.

§ 5.1.8 Reduction or limitation of retainage, if any, shall be as follows:

(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Sections 5.1.6.1 and 5.1.6.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)

§ 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 Section 12.2.2 of AIA Document A201–2007, 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:

Init.

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 INITIAL DECISION MAKER

The Architect will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201–2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker. *(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)*

§ 6.2 BINDING DISPUTE RESOLUTION

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201–2007, the method of binding dispute resolution shall be as follows: *(Check the appropriate box. If the Owner and Contractor do not select a method of binding dispute resolution below, 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.)*

- Arbitration pursuant to Section 15.4 of AIA Document A201–2007
- Litigation in a court of competent jurisdiction
- Other *(Specify)*

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 A201–2007.

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2007.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2007 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

(Insert rate of interest agreed upon, if any.)

%

§ 8.3 The Owner’s representative:
(Name, address and other information)

1638 South Walnut Street
Seymour, IN 47274

§ 8.4 The Contractor’s representative:

(Name, address and other information)

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

§ 8.6 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 9.1.1 The Agreement is this executed AIA Document A101–2007, Standard Form of Agreement Between Owner and Contractor.

§ 9.1.2 The General Conditions are AIA Document A201–2007, General Conditions of the Contract for Construction.

§ 9.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
----------	-------	------	-------

§ 9.1.4 The Specifications:

(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

Section	Title	Date	Pages
---------	-------	------	-------

§ 9.1.5 The Drawings:

(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

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

§ 9.1.6 The Addenda, if any:

Number	Date	Pages
--------	------	-------

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

§ 9.1.7 Additional documents, if any, forming part of the Contract Documents:

.1 AIA Document E201™–2007, Digital Data Protocol Exhibit, if completed by the parties, or the following:

Init.

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- .2 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201–2007 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor’s bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)

ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201–2007.

(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201–2007.)

Type of insurance or bond	Limit of liability or bond amount (\$0.00)
---------------------------	--

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

 OWNER *(Signature)*

 CONTRACTOR *(Signature)*

(Printed name and title)

(Printed name and title)

SECTION 00600 – CONTRACTOR’S BOND FOR CONSTRUCTION

1.01 PROJECT MANUAL

All requirements of the Project Manual shall apply to this Section.

1.02 SCOPE

- A. The Performance Bond and Labor and Material Payment Bond shall be AIA Document A312 - 2010, comprised of two sections entitled “Performance Bond” and “Payment Bond”.
 - 1. Bonds shall be executed by an acceptable Surety Company licensed to do business in the State of **Indiana**.
 - 2. A copy of this form is bound herewith.
- B. Bonds shall be executed in an amount equal to one hundred percent (100%) of the contract amount in favor of the Owner conditioned on the full and faithful performance of the contract and full payment of all obligations arising there under.
- C. This form when fully executed becomes a part of the successful bidder’s Contract Documents.

END OF SECTION 00600



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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)

Seymour Community Schools
1638 South Walnut Street
Seymour, IN 47274

CONSTRUCTION CONTRACT

Date:

Amount: \$

Description:

(Name and location)

Seymour High School
AG-Science & Research Farm-2017
721 F Avenue, Freeman Field
Seymour, Indiana

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:)

Seymour Community Schools
1638 South Walnut Street
Seymour, IN 47274

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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.

§ 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.

Init.

§ 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.

Init.

§ 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

Company: _____ *(Corporate Seal)*

Signature: _____

Name and Title: _____

Address: _____

SURETY

Company: _____ *(Corporate Seal)*

Signature: _____

Name and Title: _____

Address: _____

Init.

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Payment Bond

CONTRACTOR:

(Name, legal status and address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status and address)

Seymour Community Schools
1638 South Walnut Street
Seymour, IN 47274

CONSTRUCTION CONTRACT

Date:

Amount: \$

Description:

(Name and location)

Seymour High School
AG-Science & Research Farm-2017
721 F Avenue, Freeman Field
Seymour, Indiana

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:)

Seymour Community Schools
1638 South Walnut Street
Seymour, IN 47274

ADDITIONS AND DELETIONS:

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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.

§ 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.

Init.

§ 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.

Init.

§ 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

Company: _____ *(Corporate Seal)*

SURETY

Company: _____ *(Corporate Seal)*

Signature: _____
Name and Title: _____
Address: _____

Signature: _____
Name and Title: _____
Address: _____

Init.

SECTION 00670 - ESCROW AGREEMENT

1.01 PROJECT MANUAL

All requirements of the Project Manual shall apply to this Section.

1.02 SCOPE

- A. All funds retained by the Owner from approved certificates for payment shall be placed in Escrow per **Indiana** Statutes.
1. Escrow Agreement Form shall be provided by the Escrow Agent and shall be acceptable to both the Owner and the Contractor.
 2. Escrow Agreement, when executed shall become a part of the Contract Documents.
 3. All escrowed funds shall be deposited in a financial institute as agreed upon by both parties to the Contract.

END OF SECTION 00670

SECTION 00700 - GENERAL CONDITIONS

1.01 PROJECT MANUAL

All requirements of the Project Manual shall apply to this Section.

1.02 SCOPE

A. The General Conditions shall be AIA Document A201 - 2007, entitled "General Conditions of the Contract for Construction".

1. A copy of which is bound herewith.

END OF SECTION 00700



AIA[®]

Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

Seymour High School
AG-Science & Research Farm-2017
721 F Avenue, Freeman Field
Seymour, Indiana

THE OWNER:

(Name, legal status and address)

Seymour Community Schools
1638 South Walnut Street
Seymour, IN 47274

THE ARCHITECT:

(Name, legal status and address)

Kovert Hawkins Architects, Inc.
630 Walnut Street
Jeffersonville IN 47130

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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 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 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

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

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§ 1.2.2 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 will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment 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 this 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 material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them 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 material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

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

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

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or

the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

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

§ 2.2.3 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.

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

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

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

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

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written 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 deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor 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. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

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 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.

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§ 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 2.2.3, 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 make 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 as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such 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 written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

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

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

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other

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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 authorized by the Architect in accordance with Sections 3.12.8 or 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

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.

§ 3.6 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 21 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 an equitable adjustment 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 in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed 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

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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 furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply 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 SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be 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, 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.

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§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be 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 the way by which 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 requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing 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 written 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

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required to provide professional services in violation of applicable law. 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 cause such services or certifications to be provided by a properly 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, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, 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. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 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, and 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 and patching shall be restored to the condition existing prior to the cutting, fitting and 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 such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's 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 or 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 Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect 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 such 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 the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such 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 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.

§ 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.

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

§ 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, except as provided in Section 3.3.1.

§ 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 report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) 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.

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§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 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 13.5.2 and 13.5.3, whether or not such 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, material and equipment 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, unless otherwise specifically stated by the Architect, 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 authorize 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 duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 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 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 or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply 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 previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, 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, which the Contractor, by these 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

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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 in writing; 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 such 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 Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 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 other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the 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, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor 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 report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report 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, except as to defects not then reasonably discoverable.

§ 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 the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors 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, and the Contractor shall proceed promptly, 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

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.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 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.

§ 7.3.6 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.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and 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 7.3.7 shall be limited to the following:

- .1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
- .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 related to the Work; and
- .5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 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 has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

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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, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 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 an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order 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

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.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's 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. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

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§ 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 material 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, material suppliers, or other persons or entities making a claim by reason of having 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 issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part 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 comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. 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. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. 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 material 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 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 the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 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 material or equipment suppliers 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 Architect will reflect such payment on the next Certificate 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 material and equipment 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 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, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment 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 and 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, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 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

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dispute resolution, then the Contractor may, upon seven additional days' written 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 shut-down, 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, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall 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 such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such 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 as required under Section 11.3.1.5 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 written 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 and, 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 terms and conditions of 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 and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial 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 and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, 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. If such lien 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 such lien, 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 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 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; or
- .3 terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material 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 or the Contractor's Subcontractors or Sub-subcontractors; and

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- .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 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 owners and users of adjacent sites and utilities.

§ 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, except damage or loss 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, written notice of such 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

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. 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 report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written 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 such material or substance or who are to perform the task of removal or safe containment of such 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

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extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, 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 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 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 indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance 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 indemnify 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 LIABILITY INSURANCE

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

- .1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- .2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- .3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 Claims for damages insured by usual personal injury liability coverage;
- .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- .7 Claims for bodily injury or property damage arising out of completed operations; and
- .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the

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Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents 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 during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE

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

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 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, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 11.3.7 WAIVERS OF SUBROGATION

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, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, 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 covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance 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 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

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§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

§ 11.4.2 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.

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, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after 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 an 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 written 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 2.4.

§ 12.2.2 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.

§ 12.2.3 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, whether completed or partially completed, of the Owner or separate contractors 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 except that, 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 such 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 such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 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.

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§ 13.4.2 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 there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 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 (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 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 13.5.1, 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 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 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.

§ 13.5.4 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.

§ 13.5.5 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.

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

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may 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.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time 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 13.7.

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 or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, 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 promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, 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' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor 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' written 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 for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- .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 above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, 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' written 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 as described in 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 written 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 Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

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, 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.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written 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 must 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 CONTINUING CONTRACT PERFORMANCE

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. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

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

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein 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.

§ 15.1.5.2 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.

§ 15.1.6 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 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, 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 arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no 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 such 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.

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§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, 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 15.1.6 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 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. 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 Either party, at its sole discretion, 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 Either party, at its sole discretion, 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 the Owner and Contractor under this Agreement.

Init.

SECTION 00810 - SUPPLEMENTARY GENERAL CONDITIONS

Unless otherwise provided in these Supplemental Conditions, all work shall be governed by the terms of AIA Document A201 - 2007, entitled "General Conditions of the Contract for Construction". The following Supplemental Conditions, modify, delete from and add to AIA A201. Where an Article Paragraph, Subparagraph or Clause of AIA A201 is modified, deleted from or added to by these Supplemental Conditions, the unaltered provisions of that Article, Paragraph, Subparagraph or Clause shall remain in full force and effect. To the extent that there is any conflict or ambiguity between AIA A201 and these Supplemental Conditions, then these Supplemental Conditions shall control.

ARTICLE 1 - GENERAL PROVISIONS

1.1.1 THE CONTRACT DOCUMENTS

Add the following:

The Contract Documents also include the following bid documents:

1. Proposal Form (Form 96, Part I and II) – Contractor's Bid for Public Works.

1.1.5 THE DRAWINGS

Add the following Paragraphs:

- | | |
|---------|---|
| 1.1.5.1 | The Drawings are a graphic representation intended to convey the design intent of the Project. They are a 2-dimensional representation of a 3-dimensional Project, and they do not provide a detail for every construction condition of the project. The Drawings are a small scale representation of complex construction assemblies and components, and not every element of the Project can be indicated in these small scale representations. The Drawings are not an instruction manual, nor are they assembly instructions. They are meant for use by experienced, competent construction professionals with the ability to read, interpret, co-ordinate, interpolate and infer information from them. The Drawings do not indicate every component and assembly necessary to construct the Project. It is the Contractor's responsibility to provide all components and assemblies necessary to provide a safe, complete and finished Project, which is reasonably fit for its intended purpose, whether or not such components and assemblies are detailed on the Drawings. |
| 1.1.5.2 | In general, all drawings are diagrammatic and schematic, and cannot indicate every offset, fitting, and accessory, nor can they indicate the field coordination work required to avoid all conflict with other trades. Contractor shall check drawings, shop drawings, and actual equipment of other trades to verify spaces available and make reasonable modifications, as directed, without extra cost to Owner; maintain headroom and other requirements in all areas; and where such requirements appear inadequate, notify Architect/Engineer before proceeding. |

1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

Add the following sentence to Paragraph 1.2.1:

It is the Contractor's responsibility to provide all work necessary for a complete and finished Project of first class quality. The Contractor will work skillfully, carefully and will perform in all respects in a workmanlike manner.

Add the following Paragraphs 1.2.2.1 and 1.2.3.1:

- 1.2.2.1 The Drawings are not intended to define the scope of work among various trades, sub-contractors,

material suppliers and vendors. The sheet numbering system is for the convenience of the Architect and the Architect's consultants only, and is not intended to define a sub-contractor's or material supplier's scope of work. Information is detailed, described and located at various locations throughout the Drawings. No consideration will be given to requests for change orders which relate to a failure of the Contractor, or the Contractor's sub-contractors and suppliers to obtain and review a complete set of Contract Documents during bidding, nor to maintain a complete set of Contract Documents during construction. Where bidding is separated into a number of different prime contracts, this paragraph applies to each of the separate prime contracts.

- 1.2.3.1 In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following priorities.
1. The Agreement
 2. Addenda, with those of later date having precedence over those of earlier date.
 3. The Supplementary Conditions.
 4. The General Conditions of the Contract for Construction.
 5. Drawings and Specifications.

In the case of an inconsistency between Drawings and Specifications or within either Document not clarified by addendum, the better quality or greater quantity of Work shall be provided in accordance with the Architect's interpretation. The Contractor has a duty to inquire about possible ambiguities and inconsistencies which are patent or obvious during the bidding process, and will not receive additional compensation or be excused from resulting difficulties in performance for failure to point out any inconsistencies after that point. In the case of disregard by the Contractor of such inconsistencies and ambiguities, the Architect may require the Contractor to remove and correct work which has been installed at no additional cost to the Owner.

ARTICLE 2 - OWNER

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

2.2.2 DELETE Subparagraph 2.2.2 in its entirety.

2.2.3 DELETE Subparagraph 2.2.3 in its entirety and replace with the following:

Neither the Owner nor the Architect shall be liable for inaccuracies or omissions contained in any surveys for the site of the Project, nor shall any inaccuracies or omissions in such items relieve the Contractor of its responsibility to perform the Work in accordance with the Contract Documents.

2.2.5 Replace Subparagraph 2.2.5 with the following:

The Contractor will be furnished free of charge ten (10) copies of Drawings and Project Manuals. Additional sets will be furnished at the cost of reproduction, postage and handling.

ARTICLE 3 - CONTRACTOR

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

3.3.4 ADD the following new Subparagraph:

The Contractor shall maintain total control of and shall be fully responsible for the Contractor's employees, agents, representatives, workers, Subcontractors, sub-subcontractors and other such persons or entities, and shall remove from the Site any such persons or entities not in compliance with the

Contract Documents as interpreted by the Architect or the Owner. The Contractor shall assure harmonious labor relations at and adjacent to the Site so as to prevent any delays, disruption or interference to the Work. The Contractor shall prevent strikes, sympathy strikes, slowdowns, work interruption, jurisdictional disputes or other labor disputes resulting for any reason whatsoever, from the acts or failure to act, of the employees of the Contractor or any of its Subcontractors material suppliers, or other such persons or entities. The Contractor agrees that it will bind and require all of its Subcontractors, material suppliers and other such persons or entities to agree to all of the provisions of this subparagraph. If the Contractor or any of its Subcontractors, material suppliers or other such persons or entities fail to fulfill any of the covenants set forth in the Subparagraph, the Contractor will be deemed to be in default and substantial violation of the Contract Documents.

3.5 WARRANTY

Add the following new Subparagraphs 3.5.2, 3.5.3, 3.5.4, 3.5.5, 3.5.6, 3.5.7, 3.5.8 and 3.5.9.

- 3.5.2 For a period of one (1) year from the date of Substantial Completion, the Contractor warrants as provided in Subparagraph 3.5.1 and further warrants to the Owner, and the Architect that (a) all movable or adjustable work shall remain in working order, including hardware, doors, windows, apparatus, machinery, mechanical and electrical equipment and (b) the Contractor's portion of the Work shall be waterproof and weatherproof in every respect.
- 3.5.3 In addition to all the Contractor warranties and obligations to correct defective Work provided by law or as set forth in any of the Contract Documents, the Contractor agrees, upon notice from the Owner or the Architect, to pay for, and if requested, correct, repair, restore and cure any damage or injury, whenever the same shall occur or appear, resulting from any defects, omissions or failure in workmanship or materials, and indemnify, hold harmless, and defend the Owner against any and all claims, losses, costs, damages and expenses, including attorneys' fees, suffered by the Owner as a result of such damage or injury, whenever such damage or injury shall occur or appear.
- 3.5.4 The commencement and terms of the guarantees and warranties required by the Contract Documents shall not in any manner be affected by any delay in the commencement, progress or completion of the Work, regardless of the cause therefore.
- 3.5.5 The foregoing guarantees and warranties shall not shorten any longer warranty or liability period provided for by law or in the Contract Documents or otherwise received from the Contractor or any Subcontractor, material supplier or manufacturer, nor supersede the terms of any special warranty given by the Contractor, nor shorten any period of the Contractor's legal liability for defective Work, but shall be in addition thereto.
- 3.5.6 Notwithstanding anything to the contrary contained herein with respect to warranties, it is understood and agreed that the foregoing warranties and guarantees shall not affect, limit or impair the Owner's right against the Contractor with regard to latent defects in the Work which do not appear within the applicable warranty period and which could not, by the exercise of reasonable care and due diligence, be ascertained or discovered by the Owner within such warranty period. The Contractor shall be correct and cure any such latent defects which are reported to the Contractor by the Owner in writing within ninety (90) days after such latent defect first appears or could, by the exercise of reasonable care and due diligence, be ascertained or discovered by the Owner.
- 3.5.7 Neither the acceptance of any of the Work by the Owner, in whole or in part, nor any payment, either partial or final, by the Owner to the Contractor, shall constitute a waiver by the Owner of any claims against the Contractor for defects in the Work, whether latent or apparent, and no such payment or acceptance of the Work by the Owner shall release or discharge the Contractor of the Contractor's surety,

if any, from any such claims for breach of such warranties.

3.5.8 Upon completion of the Work, the Contractor shall furnish the Owner with all written warranties, guarantees, operating manuals, all shop drawings and submittals used in the project relative to equipment installed, and if requested by the Architect, a complete set of reproducible drawings with all field changes noted on them relating to the improvements constructed.

3.5.9 If required by the Owner or the Architect, the Contractor shall deliver to the Owner a signed affidavit stating that the Work has been constructed in accordance with the Contract Documents. If such affidavit is required, final payment or a final certificate for payment shall not be tendered until such affidavit has been delivered to the Owner.

3.6 TAXES

3.6.1 ADD the following new Subparagraph:

Material and properties purchased by contracts with the Owner that become a permanent part of the structure or facilities constructed are not subject to the Indiana Gross Retail Tax (Sales Tax). The Contractor shall obtain a copy of the Owner's exemption certificate and then issue copies of this certificate to his suppliers when acquiring materials and properties for use on the Project. The Contractor shall enforce this exemption clause for his purchases and for those of his Subcontractors.

3.8 ALLOWANCES

Refer to Section 01210 - Cash Allowances for further provisions on this subject.
Refer to Section 01220 - Contingency Allowance for further provisions on this subject.

3.12 SHOP DRAWINGS, PROJECT DATA AND SAMPLES

Refer to Section 01330 - Submittal Procedures for further provisions on this subject.

3.13 USE OF SITE

ADD the following new Subparagraphs 3.13.1 and 3.13.2:

3.13.1 If the Owner requires the contractor to relocate materials or equipment which have been stored on the Site or within the Project, the Contractor shall relocate such materials or equipment at no additional cost to the Owner.

3.13.2 The Contractor is solely responsible for its Site access. The Contractor shall keep all roads, walks, ramps and other areas on and adjacent to the Site in good working order and condition and free from obstructions which might present a hazard to or interference with traffic or the public. When construction operations necessitate the closing of traffic lanes, the Contractor shall be responsible for arranging such closings in advance with the authorities having jurisdiction, the Owner, and adjacent property Owners. The Contractor shall provide adequate barricades, signs and other devices for traffic guides and public safety. Contractor shall maintain all adjacent streets to that Project in a clean condition and shall clean all dirt and mud from the Project and from such adjacent street on a daily basis.

3.14 CUTTING AND PATCHING

Refer to Section 01732 - Cutting and Patching for further provisions on this subject.

3.15 CLEANING UP

Refer to Section 01740 - Cleaning for further provisions on this subject.

ARTICLE 4 – ARCHITECT AND CONSTRUCTION MANAGE

4.2 ADMINISTRATION OF THE CONTRACT

ADD the following new Subparagraphs 4.2.2.1 and 4.2.2.2:

- 4.2.2.1 The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for site visits made necessary by the fault of the Contractor or by defects or deficiencies in the Work.

ARTICLE 6 - CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

6.2 MUTUAL RESPONSIBILITY

ADD the following new Subparagraphs 6.2.6 and 6.2.7:

- 6.2.6 No Contractor, other Contractor, or Subcontractor, shall be entitled or permitted to sue or make a claim against the Owner or the Architect on account of any delay, disruption or acceleration or damage related thereto. If, however, the Owner or the Architect is sued or receives a claim from a Contractor or other Contractor on account of any alleged delay, disruption, interference or acceleration or damage related thereto caused, or alleged to be caused, in whole or in part, by the Contractor, the Contractor shall defend and indemnify the Owner and the Architect therefore, and reimburse them for their attorney's fees, costs and expenses.
- 6.2.7 Inasmuch as the completion of the Project within the Contract Time is dependent upon the close and active cooperation of all those engaged therein, it shall be expressly understood and agreed that the Contractor shall lay out and install its Work at such time or times and in such manner as not to delay, interfere, or disrupt the Work of others.

ARTICLE 7 - CHANGES IN THE WORK

7.1 GENERAL

Add the following new Subparagraphs 7.1.4 and 7.1.5:

- 7.1.4 Consultants to Architect or Owner:
1. Consultants to Architect or Owner shall have NO authority to modify Contract requirements in the Scope of Work or Contract Time.
 2. Consultants to Architect or Owner shall have no direct communication with Contractor or subcontractors, suppliers and vendors to Contractor without the express consent of the Architect.
 3. Any direct communication authorized by the Architect shall be for clarifications of the Work only and shall not act to authorize any changes in the Scope of Work, Contract Sum or Contract Time.
- 7.1.5 The overhead, profit and commission percentages included in a Change Order or Construction Change Directive must not exceed the maximums given at the end of this paragraph, and will be considered to include, but not be limited to, insurance (other than Workman's Compensation Insurance, FICA, Medicare and FUTA), bonds, small tools, incidental job burdens, supervisory expense, project management expense, clerical expense, preparatory expense and general office expense. Workmen's Compensation Insurance, and employment taxes under FICA, Medicare and FUTA are to be itemized separately and no percentage for overhead, profit and commission will be allowed on them. The percentages for overhead, profit and commission will be negotiated and may vary according to the nature, extent and complexity of the work involved, but not to exceed the maximum percentages shown. Not more than three percentages will be allowed regardless of the number of tiers of sub-contractors; that is, the markup on work

subcontracted by a subcontractor will be limited to one overhead percentage and one profit percentage in addition to the prime contractor's commission percentage. On proposals covering both increases and decreases in the amount of the contract, the overhead, profit, and where applicable, commission, will be computed on the net change only. On proposals for decreases in the amount of the contract, the overhead and profit shall be added to the decrease in direct cost:

<i>Description</i>	<i>Overhead</i>	<i>Profit</i>	<i>Commission</i>
To Contractor on work performed by other than his/her own forces	0%	0%	10%
To Contractor for that portion of work performed by his/her own forces	10%	10%	0%
To Sub-contractor for that portion of work performed by his/her own forces	10%	10%	0%

7.3 CONSTRUCTION CHANGE DIRECTIVES

Add the following new Subparagraph to 7.3.7.6:

7.3.7.6 Amount for overhead and profit as set forth in this Agreement shall be in accordance with the schedule set forth in Article 7.1.5.

ARTICLE 8 - TIME

8.2 PROGRESS AND COMPLETION

ADD the following Subparagraphs 8.2.4, 8.2.5 and 8.2.6:

8.2.4 Whenever it may be useful or necessary for the Owner to do so, the Owner may take possession of the Project or parts thereof at any time that it is determined by the Architect that the Work has been completed to a point where the Owner may occupy or use said Project, or parts thereof, without interference, delay or disruption to the continued execution of the work. The Owner may at such time install furnishings and equipment as it sees fit or may at its discretion hire other Contractors for this purpose. Such use or occupation shall not relieve the Contractor of these warranty obligations as provided in the Contract Documents nor shorten their commencement dates.

8.2.5 Except as otherwise provided herein, substantial completion of work shall be within the number of calendar days stated by the Contractor on the Proposal Form and shall become a contract obligation. The time for completion of the work shall be extended for the period of any excusable delay, which term shall include only those delays directly caused by any of the reasons enumerated in the following subparagraph 8.3.2 and 8.3.3.

8.2.6 Completion shall be understood to be substantially complete for the Owner's beneficial occupancy, with only minor Punch List" items yet to be completed and items such as balancing of heating system, etc., which cannot be completed due to climatic conditions.

8.3 DELAYS AND EXTENSIONS OF TIME

DELETE Subparagraph 8.3.1 in its entirety and substitute the following:

8.3.1 If the Work is delayed, disrupted, interfered with or constructively accelerated (hereinafter and

collectively referred to as "Hinderance" or "Hindrances") at any time by any act or neglect of the Owner, the Architect, other Contractors or Subcontractors, or any of their employees, or by changes ordered in the Work, fire, unusual delay in transportation, unavoidable casualties, or other cause beyond the Contractor's control as elsewhere provided in the Contract Documents, then the Contract Time shall be increased by Change Order for such reasonable time as the Architect may determine.

DELETE Subparagraph 8.3.3 in its entirety and substitute the following:

- 8.3.3 Whether or not any Hinderance shall be the basis for an increase in the Contract Time, the Contractor shall have no claim against the Owner or the Architect for an increase in the Contract Sum, nor a claim against the Owner or the Architect for a payment or allowance of any kind for damage, loss or expense resulting from any Hinderance. As between the Contractor and the Owner, except for acts constituting intentional or grossly unreasonable interference by the Owner or the Architect with the Contractor's performance of the Work when such acts continue after the Contractor's written notice to the Owner of such interference or disruption, the Contractor shall assume the risk of all Hindrances arising from any and all causes whatsoever, including without limitation, those due to any act or omission of the Owner or the Architect, except only to the extent that an increase to the Contract Time may be due to the Contractor as expressly provided for in this Subparagraph. The Contractor shall bear all costs, expenses and liabilities in connection with Hindrances and all costs, expenses and liabilities of any nature whatsoever, whether or not provided for in the Contract Documents, shall conclusively be deemed to have been within the contemplation of the parties. The only remedy available to the Contractor shall be an increase in the Contract Time.

ADD the following new Subparagraphs 8.3.4, 8.3.5 and 8.3.6:

- 8.3.4 The Owner's exercise of any of its rights under the Contract Documents, including but not limited to its rights regarding changes in the Work, regardless of extent or number of such changes, performance of separate Work or carrying of the Work by the Owner or the Architect, directing overtime or changes in the sequence of the Work, withholding payment or otherwise exercising its rights hereunder, or exercising any of its remedies of suspension of the Work or requirements of correction or re-execution of any defective Work shall not, under any circumstances, be construed as intentional interference or disruption with the Work.
- 8.3.5 No increase in the Contract Time shall be granted for any Hinderance resulting from unsuitable ground conditions, inadequate forces, the failure of the Contractor to place orders for equipment or materials sufficiently in advance to insure their delivery when needed, or any Hinderance resulting from interruptions to or suspensions of the Work so as to enable others to perform their Work, other than as specifically provided elsewhere in the Contract Documents.
- 8.3.6 If the Contractor causes a Hinderance to the Work so as to cause any damage to the Owner or any damages for which the Owner may become liable, the Contractor shall be liable therefore and the Owner may withhold from any amount yet due the Contractor the amount reasonably required to compensate the Owner for such damages, if the amount of compensation exceeds the amount yet paid to the Contractor, the Contractor shall pay the difference to the Owner immediately upon demand.

ARTICLE 9 - PAYMENTS AND COMPLETION

9.2 SCHEDULE OF VALUES

Add the following new Subparagraph 9.2.2:

- 9.2.2 Contractor shall obtain written concurrence in such schedule of values from the Surety furnishing any

Performance Bond and Labor and Materials Payment Bond. Copy of written concurrence by the Surety shall be submitted by the time of written submission.

9.3 APPLICATIONS FOR PAYMENT

ADD the following new Subparagraphs: 9.3.1.3, 9.3.1.4, 9.3.1.5, and 9.3.1.6:

- 9.3.1.3 The Owner will pay ninety-five percent (95%) of the amount due the Contractor on Account of progress payments for the entire period of the Contract.
- 9.3.1.4 A subcontractor shall be paid ninety-five percent (95%) of the earned sum by the Contractor for the entire period of the Contract.
- 9.3.1.5 The Owner, Contractor and the Architect/Engineer shall cooperate to the end that retentions shall be paid promptly when all conditions of the Contract have been met.
- 9.3.1.6 Applications for payment, subsequent to the first application, shall be accompanied by Waivers of Lien from the Contractor and all major subcontractors, suppliers, and vendors.

ADD the following at the end of Subparagraph 9.3.3:

- 9.3.3 This provision shall not be construed as relieving the Contractor from the sole responsibility and expense for the care and protection of materials and Work upon which payments have been made or the restoration of any stolen, destroyed or damaged Work, or as a waiver of the right of the Owner to require the fulfillment of all of the terms of the Contract Documents.

9.5 DECISIONS TO WITHHOLD CERTIFICATION

ADD the following new Subparagraph 9.5.4:

- 9.5.4 If any claim or lien is made or filed with or against the Owner, the Architect, the Project, or the Contract Sum by any persons or entity claiming that the Contractor, Subcontractor, or other person for whom the Contractor is responsible has failed to make payment for labor, services, materials, equipment, taxes or other items or obligations furnished or incurred in connection with the Work, or if at any time there shall be any evidence of such non-payment of any claim or lien which is chargeable to the Contractor, or if the Contractor, Subcontractor, or other person or entity for whom the Contractor is responsible caused damage to any Work on the project, or if the Contractor fails to perform or is otherwise in default under any terms or provisions of the Contract, the Owner shall have the right to retain from any payment then due or thereafter an amount which it deems sufficient to (1) satisfy, discharge and/or defend against such claim, lien, or action brought for judgment which may be recovered thereon, (2) make good any such non-payment, damage, failure, or default (3) compensate the Owner and Architect for any and all losses, liabilities, damages, costs, and expenses, including legal fees and costs, which may be sustained or incurred by either or both of them in connection therewith. The Owner shall have the right to apply and charge against the Contractor retained amounts as may be required for these purposes. If the amount retained is insufficient, the Contractor shall be liable for the difference and pay it directly to the Owner.

9.6 PROGRESS PAYMENTS

DELETE Subparagraph 9.6.6 in its entirety and replace with the following:

- 9.6.6 No recommendation or certification of a progress payment, any progress payment, final payment, or any partial or entire use or occupancy of the Project by the Owner, shall constitute acceptance of any Work

not in accordance with the Contract Documents.

ADD the following new Subparagraph 9.6.8:

- 9.6.8 On all Contracts totaling two hundred thousand dollars (\$200,000.00) or more, an escrow account shall be established in a financial institution, as escrow agent, selected by mutual agreement between the Contractor and the Owner at the time Contracts are executed. The establishing of the escrow account shall be in compliance with the requirement of Indiana Code 36-1-12-14.
1. The Escrow Agent shall invest all escrowed principal in obligations selected by the Escrow Agent.
 2. The Escrow Agent shall hold the escrowed principal and income until receipt of notice from the Owner and the Contractor, or the Contractor and the Subcontractor, specifying the part of the escrowed principal to be released from the escrow and to whom that portion is to be released. After receipt of the notice, the Escrow Agent shall remit the designated part of escrowed principal and the same proportion of then escrowed income.
 3. The Escrow Agent shall be compensated for its services as the parties may agree in the amount not to exceed fifty percent (50%) of the escrowed income of the escrow amount.
 4. See Section 9.10 - Final Completion and Final Payment, for provisions of retainage in escrow and final payment.

9.9 PARTIAL OCCUPANCY OR USE

- 9.9.1 DELETE the phrase "when such portion is designated by separate agreement with the Contractor" in line 2; DELETE the last two sentences in Subparagraph 9.9.1.

9.10 FINAL COMPLETION AND FINAL PAYMENT

- 9.10.1 ADD the following sentence at the end of the Subparagraph:

"Provided, however, that final payment shall not be due and payable until sixty-one (61) days after the Work has been completed and the Contract fully performed".

- 9.10.4 ADD the following at the end of Subparagraph 9.10.4:

"Final payment constituting the unpaid balance of the Contract Sum shall be paid to the Contractor in full, including any retainage *or escrowed principal and escrowed income by the escrow agent*, no less than sixty-one (61) days following the date of substantial completion. If at any of that time there are any remaining uncompleted items, an amount equal to two hundred percent (200%) of the value of each item as determined by the Architect shall be withheld until said items are completed and a Final Certificate of Payment is issued by the Architect".

DELETE Subparagraph 9.10.5 in its entirety and replace with the following:

- 9.10.5 The Contractor's obligation to perform the Work and complete the Project in accordance with the Contract Documents shall be absolute. Neither approval of any progress or final payment, nor the issuance of a Certificate of Substantial Completion, nor any payment by the Owner to the Contractor under the Contract Documents, nor any use or occupancy of the Project or any part thereof by the Owner, nor any act of acceptance by the Owner shall constitute an acceptance of Work not in accordance with the Contract Documents, nor does it constitute a waiver of any claims that arise from: (1) liens, claims, security interests or encumbrances arising out of the contract or settled; or (2) terms of any warranties in favor of the Owner that are provided pursuant to the Contract Documents or otherwise.

ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

DELETE Subparagraph 10.1.1 in its entirety and replace with the following:

- 10.1.1 The Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work and in connection with the Contractor's performance of any work other than the Work.

10.2 SAFETY OF PERSONS AND PROPERTY

- 10.2.1 REPLACE the words "reasonable" with the phrase "all necessary" in both instances in line 1.

ADD the following to Subparagraph 10.2.1:

- .4 Protect excavation, trenches, buildings and grounds from all water damage. Furnish necessary equipment to provide this protection during the term of the Contract. Construct and maintain necessary temporary drainage to keep excavations free of water.
- .5 Provide protection of the Work against wind, storms, cold and heat. At the end of each day, cover new Work which may be damaged;
- .6 Provide adequately-engineered shoring and bracing required for safety and for the proper execution of the Work and have same removed when the Work is completed; and
- .7 Protect, maintain and restore benchmarks, monuments and other reference points affected by the Work. If benchmarks, monuments or other reference points are displaced or destroyed, points shall be re-established and markers reset under the supervision of a licensed surveyor, who shall furnish certificates of its work.

- 10.2.5 INSERT the work "solely" after the word "loss" in the clause which reads "except damage or loss attributable to acts or omissions of the Owner or Architect...".

ADD the following new Subparagraphs 10.2.9, 10.2.10 and 10.2.11:

- 10.2.9 "The Project is designed to be self-supporting and stable after the Work is fully completed. Except as otherwise provided, it is solely the Contractor's responsibility to determine erection procedures and sequences, and to insure the safety of the Project and its component parts during erection. This includes, but is not limited to, the addition or modification of whatever temporary bracing, guys or tie downs may be necessary. Such material shall be removed after completion of the Work".
- 10.2.10 The Contractor shall conform with the United States Department of Labor and the State Division of Labor Occupational Safety and Health Administration regulations.
- 10.2.11 The Contractor shall have the Hazard Communication Program in effect with all their personnel working on the project. All Material Data sheets should be current as required by law.

ARTICLE 11 - INSURANCE AND BONDS

11.1 CONTRACTOR'S LIABILITY INSURANCE

- 11.1.2 Add the following limits of liability:

- .1 Workmen's Compensation - statutory.
Employer's Liability - \$100,000.
- .2 Comprehensive General Liability (including Premises - Operations, Independent Contractor's

- Protective, Products and Completed Operations, Broad Form Property Damage):
- a. Bodily Injury:
\$1,000,000 - one person aggregate per project endorsement. CG2503 to be included
\$1,000,000 - annual aggregate.
 - b. Property Damage:
\$500,000 - each occurrence.
\$1,000,000 - annual aggregate.
 - c. Property Damage Liability Insurance shall include coverage for the following hazards: X (Explosion), C (Collapse), U (Underground).
 - d. Wavier of subrogation to be included
 - e. Additional insured form CG2010 to be included
- .3 Contractual Liability (Hold Harmless Coverage).
- a. Bodily Injury:
\$1,000,000 each occurrence
 - b. Property Damage:
\$500,000 each occurrence
\$500,000 aggregate
- .4 Personal Injury, with employment exclusion deleted:
\$1,000,000.
- .5 Comprehensive Automobile Liability (Owned, Non-Owned, Hired):
- a. Bodily Injury:
\$1,000,000 each person.
\$1,000,000 each accident
 - b. Property Damage:
\$500,000 each occurrence.
 - c. Owner to be named as additional insured and provided a Waiver of Subrogation.
- .6 Catastrophic Umbrella Coverage, including products - complete operations:
\$2,000,000
- .7 Prime Contractors and all subcontractor's insurance shall be primary and non-contributory on all insurance.

Add the following new Subparagraph 11.1.5:

- 11.1.5 The Contractor shall furnish one copy of Certificate of Insurance, Indiana State Industrial Board Form 18A, required of each copy of the agreement, which shall specifically set forth evidence of all coverages required. Furnish Owner copies of any endorsements subsequently issued amending coverage limits.

11.3 PROPERTY INSURANCE

- 11.3.1 Change the last sentence to ADD: "Architects and Engineers of Record after "Subcontractors".

ADD the following new Subparagraph 11.3.7.1:

- 11.3.7.1 Any errors and omissions insurance maintained by the Architect or the Architect's Consultants shall not serve to exclude the Architect or Architect's Consultant from the mutual waiver of rights outlined in paragraph 11.3.7. The waiver of rights is given in exchange for property insurance covering the work.
- 11.3.9 DELETE Subparagraph 11.3.9 in its entirety.
- 11.3.10 DELETE all words following "insurers" in the first line and put a "." after "insurers".

11.4 PERFORMANCE BOND AND PAYMENT BOND

DELETE the Subparagraph 11.4.1 in its entirety and replace with the following:

- 11.4.1 The Contractor shall furnish a Performance Bond and Labor and Material Payment Bond meeting all statutory requirements of the State of Indiana and complying with the following requirements:
- .1 The form of such bonds shall be acceptable to Owner and in compliance with **Indiana** Statute:
 - .2 The Bonds shall be executed by a responsible surety licensed in the state in which the Project is located and approved by the Owner and shall remain in effect for a period of not less than one (1) year following the date of Substantial Completion and/or time required to resolve any items of incomplete Work and the payment to any owed amounts, whichever time period extends the longer;
 - .3 The amount of the Performance Bond and the Labor and Material Bond shall each be 100% of the Contract Sum; and
 - .4 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 copy of his power of attorney indicating the momentary limit of such power.

ADD the following new Subparagraph 11.4.3:

- 11.4.3 The Contractor shall keep the surety informed of the progress of the Work, changes in the Work, requests for release of retainage, request for final payment and any other information required by the surety.

ARTICLE 13 – MISCELLANEOUS PROVISIONS

13.2 SUCCESSORS AND ASSIGNS

- 13.2.1 DELETE the last two sentences of this Subparagraph.
ADD the following as the last two sentences of the Subparagraph:

"Contractor shall not assign the Contract or any portion thereof without the written consent of Owner. Owner is entitled to assign the Contract or any portion thereof".

- 13.2.2 DELETE this Subparagraph in its entirety.

13.5 TESTS AND INSPECTIONS

- 13.5.7 ADD the following new Subparagraph:

Neither the observations of the Architect, its administration of the Contract Documents, nor inspections tests or approvals by persons other than the Contractor shall relieve the Contractor from its obligation to perform the Work in accordance with the Contract Documents.

- 13.8 ADD the following new Paragraph:

The Owner will require the Contractor to conduct a background check for criminal history for all workers on the project in compliance with Indiana Code 20-5-2-7 and 20-5-2-8.

"The Contractor shall provide, if awarded the right to provide services or materials under this agreement, a list of all personnel used by or on behalf of the Contractor, whether employed by them or not, who will be engaged in the providing of services or delivery of materials and goods.

With said list of persons shall be provided written evidence of a criminal record search with respect to all persons on the list dated within thirty (30) days of the said date of the Contract and extending at least twenty (20) years prior.

Contractor agrees that no person will be providing services who has any criminal conviction for any type of behavior that would place the students or staff at risk.

If evidence of such behavior occurs after this initial search, but during their employment on site, such worker shall be removed immediately from the site and shall be banned from the jobsite for the duration of the project.

Evidence of behavior that is prohibited would include, but not limited to, the following:

- (1) Murder [IC 34-42-1-1].
- (2) Causing suicide [IC 35-42-1-2].
- (3) Assisting suicide [IC 35-42-1-2.5].
- (4) Voluntary manslaughter [IC 35-42-1-3].
- (5) Reckless homicide [IC 35-42-1-5].
- (6) Battery [IC 35-42-2-1] unless ten (10) years have elapsed from the date the individual was discharged from probation, imprisonment, or parole, whichever is later.
- (7) Aggravated battery [IC 35-42-2-1.5].
- (8) Kidnapping [IC 35-42-3-2].
- (9) Criminal confinement [IC 35-42-3-3].
- (10) A sex offense under ([C 35-42-4].
- (11) Carjacking [IC 35-42-5-2].
- (12) Arson [IC 35-43-1-1] unless ten (10) years have elapsed from the date the individual was discharged from probation, imprisonment, or parole, whichever is later.
- (13) Incest [IC 35-46-1-3].
- (14) Neglect of a dependent [IC 35-46-1-4(a)(1) and IC 35-46-1-4(a)(2)] unless ten (10) years have elapsed from the date the individual was discharged from probation, imprisonment, or parole, whichever is later.
- (15) Child selling [IC 35-46-1-4(b)].
- (16) Contributing to the delinquency of a minor [IC 35-46-1-8] unless ten (10) years have elapsed from the date the individual was discharged from probation, imprisonment, or parole, whichever is later.
- (17) An offense involving a weapon under IC 35-47 unless ten (10) years have elapsed from the date the individual was discharged from probation, imprisonment, or parole, whichever is later.
- (18) An offense relating to controlling substances under IC 35-48-4 unless ten (10) years have elapsed from the date the individual was discharged from probation, imprisonment, or parole, whichever is later.
- (19) An offense relating to material or a performance that is harmful to minors or obscene under IC 35-49-3 unless ten (10) years have elapsed from the date the individual was discharged from probation, imprisonment, or parole, whichever is later.
- (20) An offense relating to operating a motor vehicle while intoxicated under IC 9-30-5 unless five (5) years have elapsed from the date the individual was discharged from probation, imprisonment, or parole, whichever is later.
- (21) An offense that is substantial equivalent to any of the offenses listed in this subsection in which the judgment of conviction was entered under the law of any other jurisdiction. Should the Contractor change personnel during the existence of the Contract providing for services, it shall at least ten (10) days prior to using any other personnel other than those previously disclosed, provide the same information for the new personnel as provided for under the terms of the provision."

13.9 ADD the following new Paragraph:

The Owner will require the Contractor to conduct testing for drugs and alcohol for all workers on the project. Drugs and alcohol shall be as defined by Indiana Code 35-48-4-4.

"The Contractor shall provide, if awarded the right to provide services or materials under this agreement, a list of all personnel used by or on behalf of the Contractor, whether employed by them or not, who will be engaged in the providing of services or delivery of materials and goods.

With said list of persons shall be provided written evidence of drug and alcohol testing with respect to all persons on the list dated within seven (7) days of the said date of the Contract.

Contractor agrees that no person will be providing services who has tested positive to any of the items included and shall be banned from the jobsite for the duration of the project.

Continued testing shall be conducted throughout the project duration every six months maximum. Any persons testing positive shall be removed immediately from the site and shall be banned from the jobsite for the duration of the project.

The Contractors and their employees shall meet all State and Federal statutory requirements".

13.10 ADD the following new Paragraph:

The Contractor and all its subcontractors are required to comply with all provisions of Indiana Code 22-5-1.7 to affirm that it does not knowingly employ or contract with an unauthorized alien or retain an employee or contract with a person that they subsequently learn is an unauthorized alien.

The Contractor is required to enroll in and verify the work eligibility status of all newly hired employees of the contractor through the E-Verify program as defined in IC 22-5-1.7-3.

The Contractor is not required to verify the work eligibility status of all newly hired employees of the contractor through the E-Verify program if the E-Verify program no longer exists and the Contractor signs an affidavit affirming that the Contractor does not knowingly employ an unauthorized alien.

13.11 ADD the following new Paragraph:

There shall be no firearms allowed on the project site or anywhere within the project property.

Exceptions would be made for law enforcement officials, security forces required elsewhere by these Specifications, or per other requirements or allowances specifically made by the Owner.

13.12 ADD the following new Paragraph:

There shall be no smoking or tobacco use allowed within the buildings, on the project site or anywhere within the project property. Violators shall be removed from the project immediately.

Any construction materials in contact with or exposure to such tobacco products shall be removed and replaced with new, at the Contractor's expense.

Additional requirements and levels of protection are afforded to Public Buildings in compliance with Indiana Code 16-41-37, and include an enclosed structure or part of an enclosed structure that is one of the following:

- (1) Occupied by an agency of state or local government.
- (2) Used as a classroom building or a dining area at a state educational institution (as defined in IC 20-12-0.5-1).
- (3) Used as a public school (as defined in IC 20-18-2-15).
- (4) Licensed as a health facility under IC 16-21 or IC 16-28.
- (5) Used as a station for paid firefighters.
- (6) Used as a station for paid police officers.
- (7) Licensed as a child care center or child care home or registered as a child care ministry under IC 12-17.2.
- (8) Licensed as a hospital under IC 16-21 or a county hospital subject to IC 16-22.
- (9) Used as a provider's office.
- (10) School bus (as defined in IC 16-41-37-2.3).

ARTICLE 14 - TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 TERMINATION BY THE CONTRACTOR

DELETE Subparagraph 14.1.1 in its entirety and replace with the following::

- 14.1.1 If the Work is stopped for a period of sixty (60) days under an order of any court or other public authority having jurisdiction, or as a result of any act of government such as a declaration of a national emergency making material unavailable, through no act or failure to act of the Contractor or a Subcontractor or their agents or employees or any other persons performing any of the Work under a contract with the Contractor, and the Owner has not otherwise suspended, delayed, disrupted or interrupted the Work in accordance with the Subparagraph, then the Contractor may, upon fourteen (14) days' written notice to the Owner, terminate the Contract, and recover from the Owner payment for all Work executed to date. Recovery by the Contractor of lost anticipated profit and overhead and other consequential and incidental damages is hereby specifically excluded.

- 14.1.3 DELETE all words following the words "payment for" and ADD the following after "payment for":

"all work executed to date. Recovery by the Contractor of last anticipated profit and overhead and other consequential and incidental damages is hereby excluded."

ADD the following new Subparagraph 14.1.5:

- 14.1.5 "The Owner shall not be liable to the Contractor for the Owner's failure to perform its obligations set forth herein if such performance is prevented or interrupted by war (including the consequences thereof), fire, tornado, hurricane, windstorms, labor problems, fuel or transportation shortages, civil unrest, governmental action, or any other natural or economic disaster or cause which is reasonably beyond the control of the Owner ("Force Majeure"). If the estimated duration of the Force Majeure is one year or more, the Contractor shall have the option to terminate this Contract upon thirty (30) days' written notice. In the event that the estimated duration of the Force Majeure is less than one year, the Contract Time shall be increased by the same length of time as the Force Majeure persisted."

14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

- 14.3.1 DELETE this Subparagraph in its entirety.

14.3.2 DELETE this Subparagraph in its entirety.

14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

14.4.3 DELETE the words ", and cost incurred by reason of such termination" and REPLACE with "reimbursable costs actually incurred."

DELETE the words "reasonable overhead and profit on" in the second line and REPLACE with "and an amount representing six percent (6%) of the amount of the work not executed".

ARTICLE 16 - EQUAL OPPORTUNITY

16 ADD this new Article 16, including Paragraphs and Subparagraphs as follows:

16.1 POLICIES OF EMPLOYMENT

16.1.1 The Contractor and the Subcontractor shall not discriminate against any employee or applicant for employment because of race, religion, color, age, sex or national origin, in connection with, but not limited to employment, upgrading, demotion, transfer, recruitment or recruitment advertising, layoff or termination, rates or 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 setting forth its policies of non-discrimination consistent with this Article.

END OF SECTION 00810

SECTION 01110 - SUMMARY OF WORK – SINGLE CONTRACT

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Section Includes:
 - 1. Work covered by the Contract Documents.
 - 2. Contractor's use of premises.
 - 3. Coordination of work and trades.
 - 4. Owner occupancy during construction.
 - 5. Construction scheduling and phasing.

- B. Project is being bid with construction work under one General Contract for all trades.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. The Contract Documents apply to the work of this Section.
Additional requirements necessary to complete the work may be found in other documents.
- B. Section 00700 - General Conditions
- C. Section 00810 - Supplementary General Conditions
- D. Division 1, General Requirements.

1.03 WORK COVERED BY CONTRACT DOCUMENTS

- A. Provide and pay for all materials, labor, services, equipment, licenses, permits, fees, taxes, and other items necessary for the execution, installation and completion of Work indicated in Contract Documents.

- B. The Work includes coordination with Architect, Owner's Representative, Owner's separate contractors, material suppliers and vendors.

1.04 CONTRACTOR'S USE OF PREMISES

- A. Contractor shall limit his use of premises for work and storage, to allow for Owner's occupancy as identified in this Section.

- B. Assume full responsibility for protection and safekeeping of products stored on premises.
 - 1. Obtain and pay for use of additional storage or work areas needed for operations.

- C. Contractor shall allow for any other work outside of this contract, whether by Owner's personnel or Contractors under Owner's separate contracts, to proceed without delay or impediment.

1.05 COORDINATION

- A. Schedule, manage and expedite all work under his Contract, coordinating his work with his sub-contractors, material suppliers, vendors, and trades so that no conflicts of timing or location occur.
 - 1. Work shall progress according to approved progress schedule.
Schedule dates for incorporation of work, and identify all critical path events and dates.
 - 2. Coordinate and provide all floor, ceiling, roof, and wall sleeves.
 - 3. Provide all cutting, fitting or patching required.

- B. Keep Architect informed on the progress of the work.
 - 1. Close or cover no work until duly inspected and approved.
 - 2. Uncover un-inspected work and after approval, repair and/or replace all work at no cost to Owner.
 - 3. Notify Architect at least 7 days in advance of utility connections, utility shut-offs, mechanical equipment and oil line cutovers, street or alley closings to allow ample time to receive Owner's written approval of procedure to be followed.

- C. Protection:
1. Do not close or obstruct streets, entrance drives, sidewalks or other facilities without permission of the Owner and local authorities.
 2. Furnish, erect and maintain barricades, warning lights, signs and guards as may be required.

END OF SECTION 01110

SECTION 01130 - GENERAL CONSTRUCTION REQUIREMENTS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Section Includes:
1. Special Provisions.
 2. Commencement Activity.
 3. Quality Control.
 4. Pre-final and Final/Occupancy Inspections
 5. Project Closeout.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. The Contract Documents apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- B. Section 01110 - Summary of Work - Single Contract
- C. Section 01300 - Project Meetings
- D. Section 01310 - Project Management and Coordination
- E. Section 01320 - Construction Progress Documentation
- F. Section 01640 - Owner Furnished Equipment

1.03 SPECIAL PROVISIONS

- A. Project:
The Project is the total construction for which the Contractor is responsible, including all labor, materials and equipment used or incorporated in such construction.
- B. Work:
The Work comprises the completed construction designed under the Project and includes labor necessary to produce such construction, and materials and equipment to be incorporated in such construction.
- C. Contract Documents includes the following (See General Conditions 1.1.1 for definition):
1. Project Manual. (See General Conditions 1.1.7 for definition) The Project Manual is composed of the following:
 - a. The Bidding Requirements.
 - b. The Contract Forms.
 - c. The Conditions of the Contract.
 - d. The Specifications. (See General Conditions 1.1.6 for definition)
 2. Drawings (See General Conditions 1.1.5 for definition)
 3. Addenda (See Instructions to Bidders 1.3 for definition)
 4. Other Documents as identified in the Contract for Construction, the General Conditions of the Contract for Construction, and Supplementary General Conditions
- D. Utilities:
It is the Contractor's responsibility to coordinate with the appropriate utility companies actual location of mains serving the site and route the building utility lines in the most direct route.
1. The location of utilities existing in the building as indicated on the Drawings may be modified by the Contractor to accommodate a more direct route to the utility connection location with written approval from Architect.

E. Permits and Fees:

The Contractor is responsible for verifying any and all fees required from all utilities, agencies and authorities having jurisdiction. The Contractor shall obtain and pay for the Building Permit and all other permits and governmental fees, licenses and inspections required, whether specifically referenced or not. The Contractor is to include in the bid the cost of all charges payable to State, local or special community development agencies and any additional fees as required for the completion of the project, including, but not limited to:

1. Water company connection fees and charges
2. Electrical company charges.
3. Telephone company charges.
4. Sanitary sewer connection fees and charges.
5. Gas Company charges.
6. Fire sprinkler connection fees and charges.

F. Historical and Archeological Finds: All items having any apparent historical or archeological interest discovered in the course of construction must be carefully preserved. The Contractor must leave the archeological find undisturbed and immediately report it to the Architect. Work on the project may be stopped until such find is analyzed, inspected and removed by the Governing Authority.

1.04 COMMENCEMENT ACTIVITY

A. Evidence that the Contractor has started procurement of materials, preparation and submission of shop drawings, preparation of subcontracts and other preparatory work must satisfy the requirement that work began upon receipt of Notice to Proceed.

1.05 QUALITY CONTROL

A. Testing:

1. Employ the services of an independent testing laboratory to take samples, perform tests and make inspections. The costs for such laboratory and tests shall be borne by the Contractor.
2. Submit testing reports as per Architect.
3. Refer to Section 01400-Quality Control for additional requirements.

1.06 PRE-FINAL AND FINAL/OCCUPANCY INSPECTIONS

A. The Contractor is to notify in writing, the Architect, that the work is complete for a Pre-Final Inspection (also referred to as "Final Punchlist Inspection". The Contractor must provide the Architect at least 10 calendar days advance notice.

B. The Contractor is to diligently complete all punchlist items before a Final/Occupancy Inspection is scheduled.

1.07 PROJECT CLOSEOUT

A. Cleaning during construction:

1. The premises and the job site shall be maintained in a reasonable neat and orderly condition and kept free from accumulations of waste materials and rubbish during the entire construction period. Remove crates, cartons, and other flammable waste materials or trash from the work areas at the end of each working day. Do not allow debris to blow onto adjoining properties. Respond immediately to request from adjoining property owners to remove any debris that does manage to show up on adjoining properties.
2. Maintain the project in clean condition until the Owner accepts the building.
3. Refer to Section 01740 - Cleaning for additional requirements.

B. Closeout Procedures:

Refer to Section 01770 - Closeout Procedures for additional requirements.

C. Closeout Submittals:

1. Before the project can be closed out, the Contractor shall have provided all submittals required by the Contract Documents. All submittals required by the Contract Drawings or Specifications shall be sent to the Architect for review and coordination, in accordance with the requirements of the respective Drawing or Specification section. Any items that the Architect determines are incomplete or incorrect shall be corrected and resubmitted.
2. Refer to Section 01780 - Closeout Submittals for additional requirements.
3. Refer to Section 01781 - Closeout Maintenance Materials for additional requirements.

D. Retainage:

1. The Architect will assign a monetary value to all punchlist items not completed, and to all required submittals not received, as of the date of "Final Acceptance" and an amount equal to 200 percent of the total value of those items shall be retained and/or deducted from the Contractor's final payment until the Contractor demonstrates to the Architect's satisfaction that such items have been completed or corrected. Refer to the General Conditions and Supplementary General Conditions for additional information regarding retainage.

END OF SECTION 01130

SECTION 01220 - CONTINGENCY ALLOWANCE

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Section Includes:
1. Contingency Allowance in Contract Sum.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- Section 01110 - Summary of Work - Single Contract
Section 01370 - Schedule of Values

1.03 CONTINGENCY ALLOWANCE

- A. Allow a lump sum fee of **\$50,000**
- B. To be included in the Base Bid of Contract.
- C. Itemize Contingency Allowance on Application and Certificate for Payment and Schedule of Values.
- D. Contingency Allowance to be used for unforeseen conditions encountered during the work.
- E. Do not include any contractor's additional costs in bid.
Adjustments to contingency allowance will include labor, material, transportation, overhead and profit.
All costs for these items to be included in all proposals to Architect for adjustments to contract.
- F. Use Funds in Contingency Allowance only on written agreement between Owner, Architect and Contractor.
- G. All Proposals shall be authorized by the Architect prior to execution and recorded in Contractor's as-builts and Architect's project Record Documents.
- H. Adjustment to Allowances will be made by Change Order.
Any unused amounts to be credited back to the Owner.

END OF SECTION 01220

SECTION 01230 - ALTERNATES

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Section Includes:
 - 1. Procedures for exercising alternates.
 - 2. Identification and description of alternates.

- B. All items, either indicated on the Drawings or specified in the Project Manual, not specifically indicated to be included in a specific alternate is to be included within the base bid scope of work.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Bidding Requirements: Quotation of cost for each alternate as listed on Proposal Form.

- B. Owner-Contractor Agreement: Alternates accepted by Owner for incorporation into the work.

- C. Sections of Specifications identified by work of each alternate.

1.03 PROCEDURES

- A. Alternates will be exercised at the option of Owner.

- B. Coordinate related work and modify surrounding work as required to complete the Work, including changes under each Alternate, when acceptance as designated in Owner-Contractor Agreement.

- C. All Alternates shall be bid.
Base Bid to be all work as shown on the Drawings and Specifications, except Alternates.

- D. Owner reserves the right to accept or reject any and all Alternates as determined solely at the discretion of the Owner. Alternates may be accepted or rejected independently from one another, and in any order of priority or hierarchy as determined by the Owner.

1.04 SCHEDULE OF ALTERNATES

A. **ALTERNATE NO. 1A: HVAC CONTROLS – JOHNSON CONTROLS**

- 1. Give the amount to be ADDED to the Base Bid for the following:
Complete materials, equipment and labor for the installation of the Instrumentation and Controls for HVAC as outlined in section 15900 using Johnson Controls system, software and equipment.

- 2. Base Bid to include:
No Controls

B. **ALTERNATE NO. 1B: HVAC CONTROLS – TRANE CONTROLS**

- 1. Give the amount to be ADDED to the Base Bid for the following:
Complete materials, equipment and labor for the installation of the Instrumentation and Controls for HVAC as outlined in section 15900 using Trane Tracer system, software and equipment.

- 2. Base Bid to include:
No Controls

C. **ALTERNATE NO. 1C: HVAC CONTROLS – APPROVED SUBSTITUTION**

1. Give the amount to be ADDED to the Base Bid for the following:
Complete materials, equipment and labor for the installation of the Instrumentation and Controls for HVAC as outlined in section 15900 using Approved Substitution Manufacturer's system, software and equipment.
2. Base Bid to include:
No Controls

D. **ALTERNATE NO. 2: WELDING STATIONS 5-6-7-8-9-10**

1. Give the amount to be ADDED to the Base Bid for the following:
Complete materials, equipment and labor for the installation of the Welding Stations 5-6-7-8-9-10 in Metals Lab 108:
 - a. Fabricated Welding Stations 5-6-7-8-9-10
 - b. Electrical Power Wire and Conduit to Stations 5-6-7-8-9-10
 - c. Ventilation System to Stations 5-6-7-8-9-10 per detail X/M-301
 - d. Exhaust Fans EF-5, EF-6, EF-7, EF-8, EF-9 and EF-10 scheduled on M-303, including all power and control wiring
 - e. Rooftop MUA-2, curb, ductwork, electrical power and controls complete
 - f. 3-Gas Piping to Stations 5-6-7-8-9-10 from outside tank rack, terminate with threaded cap
 - g. Compressed Air Piping to Stations 5-6-7-8-9-10
 - h. Panel D, Including all breakers and feeder wire from 'M'
 - i. Subpanel 'D' breaker in panel 'M'
2. Base Bid to include:
 - a. Open PVC conduit under floor from panel 'M' to 12" above floor at Panel 'D' location

E. **ALTERNATE NO. 3: CEILING FANS**

1. Give the amount to be ADDED to the Base Bid for the following:
Complete materials, equipment and labor for the installation of the Ceiling Fans in Large Equipment Classroom 101 and Metals Lab 108:
 - a. Branch circuit wiring from panel to fan location
 - b. Control wiring from fan to switch
 - c. Complete furnishing and installation of fans
2. Base Bid to include:
 - a. Open conduit and junction box from scheduled panel to fan location
 - b. Open conduit and switch box from scheduled switch location to fan location
 - c. Breakers in panels for fans

F. **ALTERNATE NO. 4: KITCHEN EQUIPMENT**

1. Give the amount to be ADDED to the Base Bid for the following:
Equipment and labor for the installation of the Kitchen Equipment in Foods Lab 102:
 - a. Kitchen Equipment shown on drawing K-101, Items 1 thru 9 and 11
2. Base Bid to include:
 - a. All electric service to equipment, including plug terminations
 - b. All domestic water plumbing to equipment locations with shut-off valves
 - c. All sanitary drain plumbing rough-in to equipment locations
 - d. Kitchen Equipment Item 10, Floor Sump, installed complete

G. ALTERNATE NO. 5: KITCHEN HOOD

1. Give the amount to be ADDED to the Base Bid for the following:
Equipment and labor for the complete furnishing and installation of the Kitchen Exhaust Hood System in Foods Lab 102:
 - a. Kitchen Exhaust Hood system complete as shown on drawing K-102
 - b. Includes hood, duct, exhaust fans, make-air unit, controls and ansul system
 - c. All control wiring for complete power and control operation of the system
 - d. All steel angles and hanger rods for hood installation
 - e. Electric conduit and wire from panel and connections
2. Base Bid to include:
 - a. No work related to Kitchen Hood System

H. ALTERNATE NO. 6: LAB CASEWORK

1. Give the amount to be ADDED to the Base Bid for the following:
Equipment and labor for the installation of the designated casework in Classroom 111:
 - a. Storage Cabinets, shown on drawings, elevation 8/Q201
 - b. Storage Cabinets, Clean up Counter with Sinks, shown on drawings, elevation 9/Q201
 - c. Sink fittings and final connections to water and drain.
2. Base Bid to include:
 - a. Instructor Demo Table, shown on drawings, elevations 5/Q201, 6/Q201 and 7/Q201
 - b. All domestic water plumbing to sinks with shut-off valves on elevation 9/Q201
 - c. All sanitary drain plumbing rough-in to sink locations on elevation 9/Q201
 - d. Complete plumbing water, gas and air to Instructor Demo Table

I. ALTERNATE NO. 7: EPOXY FLOOR COATING

1. Give the amount to be ADDED to the Base Bid for the following:
 - a. Delete clear floor sealer and rubber cove base in Base Bid
 - b. Furnish labor and material for all work related to installation of Decorative Epoxy Flake Floor Coating, Section 09984 of specifications
 - c. Rooms included:
 1. Food Lab 102
 2. Office 103
 3. Storage 104
 4. Corridor 108
 5. Vestibule 110
 6. Corridor 111
 7. Classroom 112
 8. Women 114
 9. Men 115
2. Base Bid to include:
 - a. Sealed Concrete per Finish Schedule I-201, item SC
 - b. Rubber Base per Finish Schedule I-201, item RB
 - c. Rooms included:
 1. Food Lab 102
 2. Office 103
 3. Storage 104
 4. Corridor 108
 5. Vestibule 110
 6. Corridor 111
 7. Classroom 112
 8. Women 114
 9. Men 115

J. **ALTERNATE NO. 8: ASPHALT PAVEMENT**

1. Give the amount to be ADDED to the Base Bid for the following:
 - a. Material and labor for the installation of Binder and Surface Courses Asphalt Paving of Parking Lot and North Drive as shown on drawing C-101
 - b. Striping parking lot
2. Base Bid to include:
 - a. Grading and crushed stone base course only. Rolled and compacted.

K. **ALTERNATE NO. 9A: DeBOURGH LOCKERS**

1. Give the amount to be ADDED to the Base Bid for the following:
Complete materials, equipment and labor for to furnish and install 40 DeBourgh brand lockers as outlined in section 10500 Lockers, of specifications
2. Base Bid to include:
No Lockers

L. **ALTERNATE NO. 9B: ALTERNATE APPROVED LOCKERS**

1. Give the amount to be ADDED to the Base Bid for the following:
Complete materials, equipment and labor for to furnish and install 40 approved alternate brand of lockers as outlined in section 10500 Lockers, of specifications
2. Base Bid to include:
No Lockers

M. **ALTERNATE NO. 10: EXTERIOR PRECAST PAINTING**

1. Give the amount to be ADDED to the Base Bid for the following:
 - a. Complete materials, equipment and labor for:
 1. Surface preparation for painting exterior of surface of precast concrete walls except those directly above roof surface.
 2. Painting of exterior surface of precast concrete walls, except those areas directly above roof surface.
2. Base Bid to include:
 - a. Complete materials, equipment and labor for:
 1. Surface preparation for painting the horizontal reveal on exterior east and west surface of precast concrete walls.
 2. Painting horizontal reveal on exterior east and west surface of precast concrete walls.
 3. Surface preparation for painting the exterior surface of precast concrete walls directly above roof surface.
 4. Painting of exterior surface of precast concrete walls directly above roof surface.

END OF SECTION 01230

SECTION 01300 - PROJECT MEETINGS

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

A. Section Includes:

1. Contractor participation in pre-bid conference, pre-construction conferences, progress meetings, and pre-installation meetings.
2. Architect shall schedule and chair Project Meetings and prepare summary minutes for distribution by Contractor to all in attendance.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

Section 01130 - General Construction Requirements
Section 01310 - Project Management and Coordination
Section 01320 - Construction Progress Documentation
Section 01330 - Submittal Procedures
Section 01400 - Quality Control
Section 01770 - Closeout Procedures
Section 01780 - Closeout Submittals
Individuals Specification Sections: Pre-installation conference

1.03 PRE-BID CONFERENCE

A. Architect will administer pre-bid conference to provide further understanding of Scope of Work.

B. Attendance:

1. Architect.
2. All prospective bidding Contractors, Subcontractors, Suppliers and Vendors.
3. Attendance is not required, but strongly encouraged.

C. Agenda:

1. Review Notice-to-Bidders.
2. Review Bid Requirements and Contractor's Bid Submittal Checklist.
3. Review Summary of Work.
4. Review Construction Document set.
5. Review Project Site (if necessary).
6. Questions and Answers.

D. Architect will notify all bidders as to time and place of Pre-Bid Conference.

1.04 PRE-CONSTRUCTION CONFERENCES

A. Architect will administer pre-construction conference.

B. Attendance:

1. Architect.
2. Owner's Representative.
3. Contractor's Project Manager.
4. Contractor's Job Superintendent.

C. Agenda:

1. Execution of Owner-Contractor Agreement.
2. Exchange of preliminary submittals.
3. Submission of executed bonds and insurance certificates.

4. Distribution of Contract Documents.
5. Submission of Schedule of Values. (If not required before hand).
6. Designation of personnel representing the parties in Contract.
7. Procedures and processing of Requests for Information, field decisions, submittals, substitutions, Applications for Payment, proposal requests, Change Orders, and contract closeout procedures.
8. Scheduling.
9. Construction facilities and temporary controls.
10. Notice to Proceed.

D. Architect will record minutes and distribute copies to Contractor and Owner and those affected by decisions made. Contractor is responsible for distribution of copies to Subcontractors, Suppliers and Vendors.

E. Architect will administer mobilization conference at Project site for clarification of Contractor responsibilities in use of site and for review of administrative procedures.

1.05 PROGRESS MEETINGS

A. Architect shall schedule and administer Project Meetings throughout progress of the Work not less frequently than every month. Additional Project Meetings shall be scheduled as appropriate to construction activity.

B. Attendance:

1. Architect.
2. Owner's Representative.
3. Contractor's Project Manager.
4. Contractor's Job Superintendent.
5. Major Subcontractors and Suppliers.
6. Contractor's Quality Control Representative.
7. Others as appropriate to agenda topics.

C. Agenda:

1. Review of and corrections to minutes of previous meetings.
2. Review of Work progress and/or payment progress.
3. Field observations, problems, and decisions.
4. Identification of problems which impede planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Status of pending changes and substitutions.
14. Other business relating to Work.
15. Review of Construction Progress Documentation.

D. Architect will record minutes and distribute copies to Owner and Contractor. Contractor shall distribute copies to all others.

- E. Contractor shall hold separate meetings with workers, sub-contractors and suppliers to coordinate means and methods of construction, and jobsite safety. Do not use Owner/Architect Progress Meetings for such purpose.

1.06 PRE-INSTALLATION MEETINGS

- A. When required in individual specification sections or as determined necessary by Architect, convene a pre-installation meeting at work site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect seven days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of installation, preparation and installation procedures.
 - 2. Review coordination with related work.
 - 3. Agenda items listed in individual specification Sections.
 - 4. Installation schedule.
- E. Architect will record minutes and distribute copies to participants, and those affected by decisions made.

END OF SECTION 01300

SECTION 01310 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Section Includes:

1. Administrative and supervisory personnel.
2. Submittals.
3. Contractor quality control.
4. Coordination Drawings.
5. Project coordination.

B. Procedures for preparation, updating and submittal of Construction Progress Documentation.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

Section 00220 - Contractor's Bid Submittal Checklist
Section 01110 - Summary of Work - Single Contract
Section 01130 - General Construction Requirements
Section 01300 - Project Meetings.
Section 01320 - Construction Progress Documentation
Section 01330 - Submittal Procedures
Section 01370 - Schedule of Values
Section 01770 - Closeout Procedures
Section 01780 - Closeout Submittals

1.03 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. Project Coordination Administrator: Contractor Representative experienced in administration, supervision, and quality control of building expansion and alteration construction, similar to Work of this Project, including mechanical and electrical work.

B. Project Field Superintendent:

1. Contractor Representative experienced in general field supervision of building construction, similar to Work of this Project, including mechanical and electrical work, to supervise, direct, inspect and coordinate Work of Contractor, subcontractors, suppliers and installers, and expedite Work to assure compliance with Construction Schedules.
2. Superintendent must read, write, and speak English fluently.
3. Superintendent must be present at the Project site whenever work is being performed. Superintendent must remain on the Project from Notice to Proceed to Substantial Completion. Do not change personnel without written permission from the Owner.

1.04 SUBMITTALS

A. Submit list of Contractor's principal staff assignments, including Project Coordination Administrator, Project Field Superintendent, Quality Control Representative, and other personnel in attendance at site; identify their duties and responsibilities.

B. Submit all items for execution of Contract as listed in Section 00220 – Contractor's Bid Submittal checklist.

C. Submit shop drawings, product data, and other required submittals, in accordance with Section 01330 - Submittal Procedures, for review and compliance with Contract Documents, for field dimensions and clearances, for relation to available space, and for relation to Work by Owner or separate Contracts.

- D. Submit Requests for Information and interpretation of Contract Documents in a timely manner and obtain replies from Architect in accordance with the Contract.

1.05 CONTRACTOR QUALITY CONTROL

- A. Perform project quality control in accordance with requirements in the Contract.
- B. Coordinate scheduling of inspection and testing required by individual specification Sections and in accordance with Section 01400 - Quality Control.

1.06 COORDINATION DRAWINGS

- A. Prepare and distribute coordination drawings where close coordination is required for installation of Products and materials fabricated off-site by separate entities, and where limited space availability requires maximum utilization of space for efficient installation of different components. Show interrelationship of components shown on separate shop drawings. Indicate required installation sequences.

1.07 PROJECT COORDINATION

- A. Coordinate construction activities and work of all trades under various Sections of these Specifications and Work of Contract to facilitate orderly installation of each part of Work. Coordinate construction operations included under different Sections of Specifications and Contract that are dependent upon each other for proper installation, connection, and operation.
- B. Where installation of one part of Work is dependent on installation of other components, either before or after that part of Work, schedule construction activities in sequence required to obtain uninterrupted installation.
- C. Obtain drawings, manufacturer's product data, instructions, and other data to provide a complete and proper installation.
 - 1. Check field dimensions prior to installing products.
Verify necessary clearances and means of access from equipment storage to final position.
 - 2. Make data and information available to trades involved.
- D. Ensure that utility requirements of operating equipment are compatible with building utilities. Coordinate Work of various specification Sections for installation and final connection of equipment.
 - 1. Assure that mechanical, plumbing, and electrical rough-ins have been properly located.
- E. Coordinate space requirements and installation of mechanical, plumbing, and electrical Work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, conduits, and wiring, as closely as possible; make runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- F. Where availability of space is limited, coordinate installation of different components to ensure maximum accessibility for required maintenance, service, and repair.
- G. Provide for installation of items scheduled for future installation.
- H. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Prepare memoranda for Architect and separate contractors where coordination of their work is required.
- I. In finished areas, conceal pipes, ducts, conduits, and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements.

- J. Coordinate completion and clean up of Work of separate Sections in preparation for completion of work per the Contract.
- K. After Owner occupancy of Project, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize to Owner.

END OF SECTION 01310

SECTION 01320 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Section Includes:

1. Construction Progress Schedule.
2. Contractor as-built drawings.
3. Provisions for format, content, revisions, submittals and distribution.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

Section 01300 - Project Meetings.
Section 01330 - Submittal Procedures.
Section 01370 - Schedule of Values.
Section 01770 - Closeout Procedures.
Section 01780 - Closeout Submittals.

1.03 CONSTRUCTION PROGRESS SCHEDULE

A. Format:

1. Prepare Schedules as horizontal bar chart with separate bar for each major portion of Work or operation, identifying first work day of each week.
2. Sequence of Listings: The Table of Contents of this Project Manual.
3. Form: Contractor's option.

B. Content:

1. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
2. Identify each item by major Specification section number.
3. Provide sub-schedules to define critical portions of entire Schedule.
4. Show accumulated percentage of completion of each item, and total percentage of Work completed, to correspond with Application for Payment. Percentage of completion shall not include stored materials.
5. Provide separate schedule of submittal dates for shop drawings, product data, and samples and dates reviewed submittals will be required from Architect. Show dates for selection of finishes.
6. Show delivery dates for Owner furnished items, if any.
7. Coordinate content with Section 01370 - Schedule of Values.

C. Revisions:

1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
2. Identify activities modified since previous submittal, major changes in scope and other identifiable changes.
3. Provide narrative report to define problem areas, anticipated delays and impact on Schedule. Report corrective action taken or proposed and its effect.

D. Submittals:

1. Submit initial Schedules immediately following Award of Contract. After review, revise data and immediately submit for re-review.
2. Submit up-dated Progress Schedules with each Application and Certificate for Payment.
3. An updated Progress Schedule is required for review/consideration for Application and Certificate for Payment.
4. Submit under transmittal letter.

- E. Distribution:
 - 1. Distribute copies of reviewed schedules to Architect job site file, subcontractors, suppliers and other concerned entities including separate contractors.
 - 2. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in Schedules.

1.04 CONTRACTOR AS-BUILT DRAWINGS

- A. Format:
 - 1. Contractor's job superintendent to record as-built conditions onto a single set of project drawings for all trades included in scope of work.
 - 2. As-built set to be kept on site at all times.
 - 3. Documentation may be hand written in ink or pasted directly onto drawings. All information must be considered to be permanently affixed.
- B. Content:
 - 1. Include work of all trades included in scope of work.
 - 2. Include all changes, errors, deviations, omissions, additions, clarifications and corrections.
 - 3. Include any item installed in a location other than that shown on contract drawings.
 - 4. Correct any inaccurate or altered dimension.
- C. Revisions:
 - 1. As-built drawings shall be updated daily with all work completed.
 - 2. Contractor job superintendent to be responsible for subcontractor information on as-built drawings.
- D. Submittals:
 - 1. As-built drawings may be reviewed at progress meetings or periodically as requested by Architect to review entries to date.
- E. Distribution:
 - 1. As built drawings shall be given to Architect prior to release of final payment.
 - 2. Refer to Section 01780 - Closeout Submittals.

END OF SECTION 01320

SECTION 01330 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Section Includes:
1. Submittal Schedule.
 2. Submittal Requirements.
 3. Shop Drawings.
 4. Electronic files provided by the Architect.
 5. Product Data.
 6. Samples.
 7. Manufacturer's Information.
 8. Review by Contractor and Architect.
 9. Re-submittals.
 10. Distribution.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- Section 01370 - Schedule of Values
Section 01630 - Product Options and Substitutions
Section 01770 - Closeout Procedures
Section 01780 - Closeout Submittals

1.03 SUBMITTAL SCHEDULE

- A. Submit to the Architect a schedule listing all submittals required for review as required in the individual specifications sections.
- B. List submittals by specification section as listed in the index.

1.04 SUBMITTAL REQUIREMENTS

- A. Formats:
1. Submit all drawings and technical data electronically in PDF format.
 - a. Furnish all submittals specified in all sections of the specifications.
 - b. Submit each section under a separate transmittal for clarity and ease of review.
 - c. Make a complete submittal for each section; do not issue multiple submittals per section.
 - d. Compile all sheets, drawings, and product data into a single electronic file for review.
Do not submit multiple PDF files per sheet or item.
 - e. Identify manufacturer and subcontractor/supplier.
 - f. Submit Material and Safety Data Sheets for all products and materials.
 - g. Name each PDF file to match specifications title and number,
matching that as listed in the project manual.
 2. Submit to Architect via Architect's project management website specific to this project.
 3. Submit actual samples for finishes, colors, and textures for approval via mail or hand delivery.
- B. Transmit submittals in accordance with approved Progress Schedule and in such sequence to avoid delay in the Work or work of other contracts.
- C. Apply Contractor's stamp, signed or initialed, certifying to review, verification of products, field dimensions and field construction criteria and coordination of information with requirements of Work and Contract Documents.
- D. Coordinate submittals into logical groupings to facilitate interrelation of the several items:

1. Finishes which involve Architect selections of colors, textures, or patterns.
2. Associated items which require correlation for efficient function or for installation.

1.05 SHOP DRAWINGS

- A. Present in a clear thorough manner, drawn by professional draftsman.
- B. Identify project with title as shown on cover of Project Manual; identify each element of drawings by reference to sheet number and detail, schedule, or room number on Contract Documents.
- C. Identify field dimensions; show relation to adjacent or critical features of Work or products.
- D. Sheet Size:
 1. Minimum: 8-1/2 x 11 inches.
 2. Maximum: 30 x 42 inches.

1.06 ELECTRONIC FILES PROVIDED BY THE ARCHITECT

- A. Architect may make available, at no cost, base xref drawings in AutoCAD format for contractor's use in preparing shop drawings.
- B. AutoCAD version of electronic files will be the latest version being utilized in the Architect's office. The Architect has no obligation to provide electronic files in a format that may be an old, outdated, reduced or simplified version of that being utilized in the Architect's office.
- C. Electronic files are an instrument of the Architect's service, and are the property of the Architect.
- D. The use of the information contained in the electronic files is at the sole risk of the user.
- E. The use of the electronic files does not relinquish the contractor from responsibilities for site and field verification of spaces, construction, conditions, requirements, dimensions, etc.

1.07 PRODUCT DATA

- A. Submit only pages which are pertinent; mark each copy of standard printed data to identify pertinent products, referenced to Specification Section and Article number. Show reference standards, performance characteristics, and capacities; wiring and piping diagrams and controls; component parts; finishes; dimensions; and required clearances.
- B. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to the Work. Delete information not applicable.
- C. Provide manufacturer's published catalog pages and industry cutsheets, with all items and options marked as appropriate to the project.

1.08 SAMPLES

- A. When finishes are specified on the Drawings, submit samples of the specified finish for approval.
- B. When finishes are not specified on the Drawings, submit full range of manufacturer's standard finishes, except when more restrictive requirements or price groups are specified, indicating colors, textures, and patterns, for Architect's selection.
- C. Submit samples to illustrate functional characteristics of products, including parts and attachments.
- D. Label each sample with identification required for transmittal letter.

- E. Submit number of samples specified in individual specifications sections but not less than three (3).
- F. Special circumstances may require additional samples for determination of acceptance, such as textures, patterns, colorways, etc. Provide sample in the quantity and/or size as required for this determination.
Requirements to be determined solely by the Architect.
All such samples will be returned to the Contractor, less those retained for Owner and Architect files.
- G. Samples for selection of finishes need to be submitted as actual samples of the actual colors, materials and textures for proper selection and review of available choices. Samples for finishes already selected as indicated in the Drawings may be color charts in lieu of actual samples, if acceptable to the Architect.
- H. All samples may be retained for Owner and Architect files.
- I. See individual Specification sections for additional information and requirements.

1.09 MANUFACTURER'S INFORMATION

- A. Manufacturer's instructions for storage, protection, preparation, assembly, installation, adjusting, balancing and finishing.
- B. Installation details, anchoring requirements or other information specifically required by manufacturer.
- C. Specific information or details required by Manufacturer to uphold warranty of product specified.

1.10 CONTRACTOR'S REVIEW

- A. Review submittals prior to transmittal; verify subcontractor's field measurements, field construction criteria, manufacturer's catalog numbers, and conformance of submittal with requirements of Contract Documents.
- B. Coordinate submittals with requirements of Work and of Contract Documents.
- C. Affix a stamp and sign each drawing, manufacturer's data, sample, etc. as follows:

<p>This submittal has been reviewed by (<i>Name of Contractor</i>) and approved with respect to the means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incidental thereto. (<i>Name of Contractor</i>) also warrants that this submittal complies with contract documents and comprises no variations or increase in contract price thereto.</p> <p>By:- _____</p> <p>Date: _____</p>

- D. Notify Architect in writing at time of submittal, of any deviations from requirements of Contract Documents. Architect will neither accept incomplete submittals, nor those which in the Architect's opinion, have not been properly reviewed by the Contractor.

- E. Do not fabricate products or begin work which requires submittals until return of submittal with Architect acceptance.
- F. Submittals which have not been thoroughly reviewed by Contractor prior to being forwarded to Architect will be rejected and returned for review.

1.11 ARCHITECT'S REVIEW

- A. Architect will review shop drawings, product data, and samples and return submittals within a reasonable time frame for complete review and approval.
- B. Architect's review is for conformance with information given and design concept expressed in the Contract Documents. The 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.
- C. Review of shop drawings does not authorize changes to the contract sum unless stated in a separate letter or change order.

1.12 RE-SUBMITTALS

- A. Make re-submittals under procedures specified for initial submittals; identify changes made since previous submittals.

1.13 DISTRIBUTION

- A. Duplicate and distribute reproductions of shop drawings, copies of product data, and samples, which bear Architect's stamp of approval, to job site file, Contractor's Record Documents file, sub-contractors, suppliers and other entities requiring information.

END OF SECTION 01330

SECTION 01370 - SCHEDULE OF VALUES

1.01 REQUIREMENTS INCLUDES

- A. Section Includes:
1. General Requirements.
 2. Format and Content.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- Section 01210 - Cash Allowances.
Section 01220 - Contingency Allowance.
Section 01310 - Project Management and Coordination.

1.03 GENERAL REQUIREMENTS

- A. Submit to the Architect/Engineer a Schedule of Values allocated to the various portions of the Work.
- B. Upon request of the Architect/Engineer, support the values with data which will substantiate their correctness.
- C. The Schedule of Values, unless objected to by the Architect/Engineer, shall be used as the basis for the Contractor's Application and Certificate for Payment.

1.04 FORMAT AND CONTENT

- A. Type schedule on AIA Document G703, Continuation Sheet for Application and Certificate for Payment. Identify schedule with:
1. Title of Project as listed on cover of Project Manual
 2. Architect project number.
 3. Name and Address of Contractor.
 4. Contract Designation.
 5. Date of submission.
- B. Schedule shall list the installed value of the component parts of the Work in sufficient detail, as determined by the Architect, to serve as a basis for computing values for progress payments during construction.
1. Follow the table of contents of this Project manual as the format for listing component items.
 2. Identify each line item with the number and title of the respective major section of the specifications.
 3. Identify separate line items for all items for materials and labor.
 4. Identify further breakdown for any and all items as determined by the Architect.
- C. For Mechanical and Electrical Scope of Work, major products or operations are to be listed.
- D. For the various portions of the work:
1. Each item shall include a directly proportional amount of the contractor overhead and profit.
 2. For items on which progress payments will be requested for stored materials, break down the value into:
 - a. The cost of the materials, delivered and unloaded, with taxes paid.
 - b. The total installed value.
- E. The sum of all values listed in the schedule shall equal the total Contract Sum.

END OF SECTION 01370

SECTION 01400 - QUALITY CONTROL

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Section Includes:
1. General Requirements.
 2. Qualifications.
 3. Laboratory Requirements.
 4. Building Survey.
 5. Quality Control Procedures.
 6. Testing and Inspection Laboratory Services.
 7. Contractor Field Inspection and Testing.
 8. Contractor's Daily Report.
 9. Contractor's Test and Inspection Reports.
 10. Non-Compliance Check-Off List.
 11. Completion and Inspection of Work.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. General Conditions: Inspections and testing required by laws, ordinances, rules, regulations or orders of public authorities
- B. Certification of products: Respective Specification sections.
- C. Test, adjust and balance of equipment: Respective specification sections.
- D. Inspection, Sampling and Testing of Projects: Respective Specifications sections for item required.
- E. Division 15.
- F. Division 16

1.03 GENERAL REQUIREMENTS

- A. Survey:
1. Engage licensed surveyor, without extra cost to the Owner.
 2. Assure correct position of building on site, establish correct levels, lines and grades, verify walls, trenches, establish grades and bench marks at all grading and drainage improvements, and otherwise fully and completely layout work required by this Contract.
- B. Inspection, Sampling, and Testing is required for:
1. Soils Compaction Control: Division 2.
 2. Cast-In-Place Concrete: Division 3.
 3. Mortar, Grout and CMU Units: Division 4.
 4. Metal Roof Deck Fastening: Division 5.
 5. Metal Floor Deck Fastening: Division 5.
 6. PVC Roofing: Division 7.
 7. Mechanical testing: Division 15.
 8. Electrical testing: Division 16.
- C. Employment of Testing Laboratory or Inspector shall in no way relieve Contractor of his obligation to perform Work in accordance with Contract and Contract Documents.

1.04 QUALIFICATIONS

A. Contractor shall hire direct and use the following testing laboratory:

1. **Alt & Witzig Engineering, Inc.**
4105 West 99th Street
Carmel, IN 46032
317-875-7000 p
317-876-3705 f

1.05 LABORATORY REQUIREMENTS

A. Meet basic requirements of ASTM E 329 for inspection and testing agencies for concrete and steel as used in construction.

B. Perform specified inspections, sampling and testing of materials and methods of construction:

1. Comply with specified standards; ASTM, other recognized authorities, and as specified.
2. Ascertain compliance with requirements of Contract Documents.

C. Promptly notify Architect/Engineer and Contractor of irregularities or deficiencies of Work which are observed during performance of services.

D. Promptly submit two (2) copies of all reports, inspections and tests to Architect, to include the following:

1. Date, project title and number.
2. Testing Laboratory name and address.
3. Name and signature of inspector.
4. Dates of inspection, sampling, and test.
5. Record of temperature and weather.
6. Identification of product and specification section.
7. Location in project.
8. Type of inspection or test.
9. Observations regarding compliance with Contract Documents.

1.06 BUILDING SURVEY

A. Horizontal Control Survey:

1. After earthwork is completed and before any foundation excavation commences, Contractor shall run and maintain a closed, offset traverse outside the building perimeter a suitable distance with 2" x 2" hub stakes driven flush and bearing a Surveyor ' s tack at all intervening building grids.
 - a. Each hub shall be flagged, protected, and identified by a clearly visible guard stake.
 - b. Appropriate temperature, and sag corrections must be applied if traverse is measured by Surveyor ' s chain.
2. If transit visibility between opposing hubs straddling the building is impossible, additional lines of hubs tacked, flagged, protected, and identified as above) shall be installed along lines through the building and tied into the perimeter traverse.
3. The completed traverse (if not run by) shall be checked, drawn up and certified by a Licensed Surveyor employed by the Contractor and approved by the Architect.
 - a. An experience record and professional references shall be submitted along with a request for the approval of any Surveyor.
 - b. One copy of the certified drawing shall be posted in the Contractor ' s field office for reference.
 - c. Additional copies of the drawing shall be posted in the Contractor ' s field office for reference.
 - d. Until such time as all foundation; reinforced concrete piers and columns; and steel column anchor bolts are in place, all stakes will be maintained.
 - e. The services of the approved Surveyor shall be secured by the Contractor to re-establish all hubs damaged or lost for any reason.

4. All foundations; concrete column dowels and forms; and steel column anchor bolts shall be located by transits set up only over traverse hub stakes.
 - a. Anchor bolts shall be secured in final position by fixing into wood templates, or other approved methods before any concrete is cast.
 - b. The Architect reserves the right to reject the equipment or the personnel.
- B. Vertical Control:
 1. After earthwork is completed, the Contractor shall establish building bench marks of 2" Ø i.d. Galvanized Pipe driven a minimum of 4'-0" into ground and having tops level with finished ground floor.
 - a. Sufficient bench marks shall be installed for each ground floor level so that no level shot will exceed 200 feet.
 - b. Level circuits will begin at and close to bench marks referenced on the site plans.
 2. The approved Licensed Surveyor shall include in his certification that he has checked (or set) all herein required bench marks.

1.07 QUALITY CONTROL PROCEDURES

- A. Monitor quality control over Contractor staff, subcontractors, suppliers, manufacturer's, products, services, site conditions, and workmanship.
- B. Comply fully with manufacturer's published instructions, including each step in sequence of installation.
- C. Should manufacturer's published instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as a minimum quality for Work, except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons who are thoroughly qualified and trained in their respective trade, to produce workmanship of specified quality.
- F. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.
- G. Perform tests required by governing authorities having jurisdiction and utilities having jurisdiction.

1.08 TESTING AND INSPECTION LABORATORY SERVICES

- A. Selection and Payment:
 1. Employment and payment for services of an Independent Testing and Inspection Laboratory to perform specified testing and inspection, by Contractor.
 2. Employment of Independent Testing and Inspection Laboratory in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents
- B. Quality Assurance:
 1. Comply with requirements of ASTM C 802, ASTM C 1077, ASTM C 1093, ASTM D 290, ASTM D 3740, ASTM D 4561, ASTM E 329, ASTM E 543, ASTM E 548, and ASTM E 699.
 2. Laboratory: Authorized to operate in State in which Project is located.
 3. Laboratory Staff: Maintain a full time registered engineer on staff to review services.
 4. Testing Equipment: Calibrated at reasonable intervals with devices of and accuracy traceable to either National Bureau of Standards or accepted values of natural physical constraints.

- C. Laboratory Responsibilities:
 - 1. Contractor should ensure the Laboratory has the following responsibilities and limits on authority (See D).
 - 2. Test samples of mixes submitted by Contractor.
 - 3. Provide qualified personnel at Project site. Cooperate with Architect and Contractor in performance of services.
 - 4. Perform specified sampling, testing, and inspection of Products in accordance with specified standards.
 - 5. Determine compliance of materials and mixes with requirements of Contract Documents.
 - 6. Promptly notify Contractor Quality Control Representative and Architect of observed irregularities or non-conformance of Work or Products.
 - 7. Perform additional tests as required by Architect.
 - 8. Attend appropriate preconstruction meetings and progress meetings.

- D. Limits on Authority:
 - 1. Laboratory may not release, revoke, alter, or expand on requirements of Contract Documents.
 - 2. Laboratory may not approve or accept any portion of Work.
 - 3. Laboratory may not assume any duties of Contractors.
 - 4. Laboratory has no authority to stop Work.

1.09 CONTRACTOR FIELD INSPECTION AND TESTING

- A. Contractor:

Test and Inspect Work provided under this Contract to ensure Work is in compliance with Contract requirements. Required tests and inspections are indicated in each individual Specification Section.

- B. Preparatory Inspection:

Performed prior to beginning Work and prior to beginning each segment of Work and includes:

 - 1. Review of Contract requirements.
 - 2. Review of shop drawings and other submittal data after return and approval.
 - 3. Examination to assure materials and equipment conform to Contract requirements.
 - 4. Examination to assure required preliminary or preparatory Work is complete.

- C. Initial Inspection:

Performed when representative portion of each segment of Work is completed and includes:

 - 1. Performance of required tests.
 - 2. Quality of workmanship.
 - 3. Review for omissions or dimensional errors.
 - 4. Examination of products used, connections and supports.
 - 5. Approval or rejection of inspected segment of Work.

- D. Follow-Up Inspections:

Performed daily, and more frequently as necessary, to assure non-complying Work has been corrected.

- E. Testing and Inspection:

Perform testing and inspection in accordance with requirements in individual Sections.

1.10 CONTRACTOR'S DAILY REPORT

- A. Submit daily report to Architect, for days that work was performed. Include the following information:
 - 1. Contractor name and address.
 - 2. Job reference and information.
 - 3. Date, weather, minimum and maximum temperatures, rainfall, and other pertinent weather occurrences.

4. Daily workforce of Contractor and subcontractors, by trades.
5. Description of work started, ongoing work, and work completed by each subcontractor.
6. Coordination implemented between various trades.
7. Approval of substrates received from various trades.
8. Nonconforming and unsatisfactory items to be corrected.
9. Remarks.
10. Reports may be faxes to Architect no more than one week's worth of reports at one time. Submit daily if requested by Architect.

1.11 CONTRACTOR'S TEST AND INSPECTION REPORTS

- A. Prepare and submit, to Architect, a written report of each test or inspection signed by Contractor Quality Control Representative performing inspection within two (2) days following day inspection was made.
- B. Include the following on written reports of inspection:
 1. Cover sheet prominently identifying that inspection "CONFORMS" or "DOES NOT CONFORM" to Contract Documents.
 2. Date of inspection and date of report.
 3. Project name, location, solicitation number, and Contractor.
 4. Names and titles of individuals making inspection, if not Contractor's Project Field Superintendent.
 5. Description of Contract requirements for inspection by referencing Specification Section.
 6. Description of inspection made, interpretation of inspection results, and notification of significant conditions at time of inspection.
 7. Requirements for follow-up inspections.

1.12 NON-COMPLIANCE CHECK-OFF LIST

- A. Maintain check-off list of Work that does not comply with Contract Documents, stating specifically what non-complying, date faulty Work was originally discovered, and date Work was corrected. No requirement to report deficiencies corrected same day it was discovered. Submit copy of Non-Compliance Check-Off List of non-complying work items to Architect on a weekly basis.

1.13 COMPLETION AND INSPECTION OF WORK

- A. Prior to final acceptance by Architect, submit a certification signed by Contractor to Architect stating that all Work has been inspected and all Work, except as specifically noted, is complete and in compliance with Contract Documents.
- B. Record Documents:
 1. By Contractor Quality Control Representative. Ensure that "As-Builts" required are marked to show any deviations which have been made during the course of construction and are kept current on a daily basis. Upon completion of the Work, certify the accuracy of the "As-Builts" and submit to Architect.
 2. Refer to Section 01320 - Construction Progress Documentation.
 3. Refer to Section 01780 - Closeout Submittals.

END OF SECTION 01400

SECTION 01420 - REFERENCES

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Section Includes:
1. Specification format and content.
 2. Quality assurance.
 3. Reference standards.
 4. Abbreviations.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

The Contract Documents, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.03 SPECIFICATION FORMAT AND CONTENT

- A. Specification Format:
Specifications are organized into Divisions and Sections based on Construction Specifications Institute (CSI) 16-Division format and Master Format numbering system.
Specific projects may also include an added Division 17-Technology and Communications.
- B. Specification Content:
This Specification uses certain conventions in use of language and intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:
1. Abbreviated Language:
Language used in Specifications and other Contract Documents is abbreviated type. Words and meanings shall be interpreted as appropriate. Words that are implied, but not stated shall be interpolated as the sense required. Singular words will be interpreted as plural and plural words interpreted as singular where applicable and context of Contract Documents so indicates.
 2. Imperative and streamlined language is used generally in Specifications. Requirements expressed in imperative mood are to be performed by Contractor. At certain locations in text, for clarity, subjective language is used to describe responsibilities that must be fulfilled indirectly by Contractor, or by others when so noted.
 3. The words "shall be" shall be included by inference wherever a colon (:) is used within a sentence or phrase.

1.04 QUALITY ASSURANCE

- A. For Products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes. Such standards are made a part of Contract Documents by reference.
- B. Conform to reference standard by date of issue current on original date of issue indicated on Contract Documents.
- C. Obtain copies of standards when required by Contract Documents.
- D. Maintain copy at Project Site during submittals, planning, and progress of specific Work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from the Architect before proceeding.

- F. The contractual relationship, duties, and responsibilities of the parties in Contract nor those of Architect shall not be altered from Contract Documents by mention or inference otherwise in any reference document.

1.05 REFERENCE STANDARDS

A. Conflicting Requirements:

Where compliance with two or more standards is specified, and the standards may establish different or conflicting requirements for minimum quantities or quality levels. Refer requirements that are different, but apparently equal, and uncertainties to Architect for decision before proceeding.

1. Minimum Quantity or Quality Levels:

Quantity or quality level shown or specified shall be the minimum provided or performed. Actual installation may comply exactly with minimum quantity or quality specified, or it may exceed minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum, as appropriate for context of requirements.

Refer uncertainties to Architect for decision before proceeding.

B. Copies of Standards:

Each entity engaged in construction on Project is required to be familiar with industry standards applicable to that entity's construction activity. Copies of applicable standards are not bound with Contract Documents.

1. Where copies of standards are needed for performance of a required construction activity, Contractor shall obtain copies directly from publication source.

1.06 ABBREVIATIONS

A. Abbreviations and Names:

Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in Specifications or other Contract Documents, they mean the recognized name of trade association, standards generating organization, authority having jurisdiction, or other entity applicable to context of text provision. Refer to "Encyclopedia of Associations," published by Gale Research Company, available in most libraries.

END OF SECTION 01420

SECTION 01510 - TEMPORARY UTILITIES

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Section Includes:

1. Responsibility of Owner and Contractor.
2. Provisions for temporary electrical power.
3. Provisions for temporary lighting.
4. Provisions for temporary heating and ventilation
5. Provisions for temporary water.
6. Provisions for temporary telephone, fax and internet.
7. Regulatory Agency Requirements.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

Section 00700 - General Conditions.

Section 00810 - Supplementary General Conditions.

Section 01110 - Summary of Work - Single Contract.

Section 01130 - General Construction Requirements.

1.03 RESPONSIBILITY

A. Responsibility of Owner:

1. Owner is not responsible for the establishment or payment of any temporary utilities.
2. Owner is not responsible for any costs directly to the contractor for non-established utility items including such items as fuels, tanks, generators, extensions, hookups, feeds, cords, hoses, wiring, etc. as may be required by the contractor for their ability to provide needed temporary utilities specified herein.
3. Owner is not responsible for any Contractor job overhead costs such as cell phones, fax, internet, water hauling, etc. that may be required as part of the construction activities.

B. Responsibility of Contractor:

1. Pay all utility bills for all new or temporary utility services within construction limits for duration of construction.
2. Coordinate establishment, timing and all requirements of all temporary utilities with all utility companies and authorities having jurisdiction.
3. Coordinate establishment, timing and all requirements of all permanent utilities, including new services and/or reworking of existing services, with all utility companies and authorities having jurisdiction.
4. Provide, install, re-install, remove, coordinate, etc, any and all temporary utilities to all areas of the site and project resulting from any and all phasing of the work.
5. Provide temporary electrical power, as required.
6. Provide temporary lighting, as required.
7. Provide temporary heating and ventilation, as required.
8. Provide temporary water, as required.
9. Provide temporary telephone, fax and internet, as required.
10. Coordinate shut-offs of any and all utilities with Owner at least 24 hours in advance.
11. Contractor to provide temporary utilities for all contractors, crews and trades under their control or within the scope of work for their contract.

1.04 DESCRIPTION

- A. Temporary Electrical Power:
1. Contractor may need to provide portable electric generators until utility service is available.
 2. Provide adequate electrical power centers, wiring and services for all tools, equipment and miscellaneous items.
 3. Locate so that power is available at any point with no more than 100 foot extension.
 4. If required, provide minimum 200 ampere volt service entrance for voltage required.
 5. Provide weather-proof distribution boxes at power centers, minimum four 20-amp 120 volt grounded outlets, with ground fault circuit breaker protection. Additional circuits as required.
 6. Provide equipment grounding continuity for entire system.
 7. Individual contractors and users provide grounded UL approved extension cords from power center.
 8. Contractor to provide power for any and all temporary field offices, architect's field office, storage and construction buildings.
 9. Contractor to provide power for temporary lighting, heating, ventilation and air conditioning.
 10. Contractor to provide power for pumping, welding and other special equipment or procedures.
 11. Provide temporary covers or plates for any and all openings, electrical boxes, receptacles, etc. that may be open during construction or awaiting installation of final covers or plates.
- B. Temporary Lighting:
1. Provide work lighting, safety lighting and security lighting.
 2. Provide lighting for construction and storage areas.
 3. Provide lighting for Owner's tours or access to site areas for review.
 4. Lightings Levels:
 - a. General work lighting and safety lighting 5 foot candles.
 - b. Finishing and detail work 20 foot candles.
 5. Periods of Service:
 - a. Work and safety lighting continuous during working hours.
 - b. Security lighting at all hours of darkness.
 6. Replace lamps throughout, as required.
 7. Provide temporary exit signs as required for phasing of work or relocation of exits and egress paths.
- C. Temporary Heating and Ventilation:
1. Provide as required to protect work and products against dampness and cold.
 2. Provide suitable ambient temperatures for installation and curing of materials.
 3. Provide adequate ventilation for safe working environment in accord with health regulations.
 4. Heat and ventilate temporary field offices and other storage and construction buildings.
 5. Temperatures Required:
 - a. Minimum 40°F, 24 hours a day.
 - b. During working hours and 24 hours a day during concrete and masonry work: 50°F.
 - c. During interior finish work, 24 hours a day, 7 days prior to placing finishes until substantial completion: 70°F.
 6. Ventilation required to prevent hazardous accumulation and harmful exposure of dusts, fumes, mists, vapors or gases.
 7. Ventilation required for curing installed materials, humidity dispersal and sanitary facilities.
 8. Gas for temporary heating shall be from portable tanks only, not the use of natural gas system.
 9. Building system may be used for temporary heat only with approval of Architect. Areas must be sufficiently cleaned so as not to cause damage to system from construction dust and dirt.
 10. New filters are to be installed prior to operation of system.
 11. Contractor to replace all filters with new in all temporary and permanently installed units during construction every two (2) weeks minimum, and more frequently during times and in areas of heavy demolition work. Maintain and install additional cloth filters over all return air outlets at all times.
 12. New filters must be replaced just prior to owner occupancy.

- D. Temporary Water:
 - 1. Provide service standpipe, centrally located, with minimum of two (2) 3/4" hose bibbs.
 - 2. Discharge pressure: Minimum 20 psi.
 - 3. Individual contractors and users provide hoses from hose bibbs.
 - 4. Maintain adequate water volume for all purposes.
 - 5. Provide water for temporary sanitary facilities, field offices, storage buildings, and cleaning and construction operations.
 - 6. Obtain required certification from authorities.
 - 7. If offsite water is required, Contractor shall pay all costs of water and hauling.
 - 8. Provide temporary caps, valves, shut-offs, and spigots as required.
 - 9. Contractor is to coordinate supply of water to areas of building which are to remain in service.
 - 10. Running of hoses through portions of an existing building is not allowed without approval of Owner.

- E. Temporary Telephone, Fax and Internet:
 - 1. Provide, maintain and pay for telephone and fax service to Contractor's field offices throughout construction.
 - 2. Provide, maintain and pay for telephone and fax service to Architect's field offices throughout construction, if separate offices are required for Architect's use.
 - 3. Contractor's job site superintendent is required to have a cellular/mobile phone at all times during normal working hours.
 - 4. Use of cellular/mobile phones are allowed for temporary phone service, except at field offices.
 - 5. Use of Owner's lines is prohibited; phone, fax, or internet.
 - 6. If contractor desires internet or e-mail service for their use at the jobsite, the contractor shall be responsible to provide it, and shall bear all costs for its installation and use. Use of any Owner's wireless internet service is prohibited, without express permission.

1.05 REGULATORY AGENCY REQUIREMENTS

- A. Obtain and pay for permits as required by authorities.

- B. Obtain and pay for temporary easements as required across property other than Owners.

- C. Comply with applicable Federal, State, and Local Codes:
 - 1. Occupational Safety and Health Act of 1970, as amended.
 - 2. National Electric Code.
 - 3. National Electric Safety Code.

- D. Comply with Utility Regulations.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials may be new or used, adequate in capacity for the purpose intended, without creating unsafe conditions or violating codes.

- B. Comply with Electrical Basic Materials and Methods, Division 16:
 - 1. Temporary wiring shall include green equipment grounding conductor and all outlets shall be grounding type.
 - 2. Provide required facilities, including transformers, conductors, poles, conduits, raceways, breakers, fuses and switches.
 - 3. Provide vapor proof and explosion proof fixtures in applicable areas.

- C. Comply with Basic Mechanical Requirements, Division 15:
 - 1. Provide required facilities, including piping, valves, pumps, pressure regulators and tanks.
 - 2. Portable Heaters: Oil or gas fired with electric blower, not requiring vent from heated space.
 - 3. Salamanders shall not be used.

PART 3 - EXECUTION

3.01 GENERAL

- A. Comply with applicable sections of Division 15, Mechanical and Division 16, Electrical.
- B. Install work in neat and orderly manner, structurally sound.
- C. Locate services to avoid interference with traffic, work and storage areas, material handling equipment and cranes.
- D. Modify service as work progress requires.

3.02 INSTALLATION

- A. Electrical:
 - 1. Service and distribution may be overhead or underground.
 - 2. Locate lighting to provide full illumination of required areas.
 - 3. Locate controls at entrance to each area.
 - 4. Install security lighting throughout all areas.
 - 5. Wire temporary heating equipment.
 - 6. Do not run branch circuits on floor.
- B. Heating and Ventilation:
 - 1. Locate to provide equitable distribution as required.
- C. Water:
 - 1. Do not run piping on floor or ground.
 - 2. Locate water outlets to provide service convenient to work.
 - 3. Provide drip pan under hose bibbs within the building, connect to drain.
 - 4. Provide insulation to prevent pipes from freezing.
 - 5. Provide temporary pumps, tanks and compressors as necessary to maintain pressure.

3.03 REMOVAL

- A. Remove completely all temporary materials and equipment upon completion of construction or when no longer required.
- B. Clean and repair damage caused by temporary installation and restore to satisfactory condition per Owner and Architect.
- C. Immediately prior to completion of project, remove temporary lamps and install new lamps throughout.

END OF SECTION 01510

SECTION 01520 - TEMPORARY CONSTRUCTION

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Section Includes:
1. Temporary Structures:
 - a. Contractor's Field Offices.
 - b. Storage Trailers.
 - c. Enclosures.
 - d. Toilets.
 - e. Stairs, Ladders, Ramps, etc.
 - f. Project Signage.
 - g. Construction Road, Parking Facilities.
 2. Installation.
 3. Removal and Cleanup.
 4. Protection.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- Section 00700 - General Conditions.
Section 00810 - Supplementary General Conditions.
Section 01110 - Summary of Work – Single Contract.
Section 01510 - Temporary Utilities.

PART 2 - PRODUCTS

2.01 TEMPORARY STRUCTURES

- A. Contractor's Field Offices:
1. Provided by General Contractor.
 2. The Contractor's offices required for general use and project meetings.
 4. Type Option: Portable typical trailer units.
 5. Windows, operable, screened; provide view of construction.
 6. Automatic heating to maintain min 70°F.
 7. Furnish emergency first-aid equipment, ABC fire extinguisher, extra hard hats.
 8. Telephones with loud outside gong on Contractor's line.
 9. Fax line and fax machine.
 10. Furnishings: Provide desk, chairs, adequate drawings reference board, drawing racks, and filing cabinets as needed.
 11. Security: Provide window and door locks so that each office can be made independently secure.
 12. Thermometer: Install a new bulb type weather thermometer on outside of office, adjacent to window for inside reading. Do not install in direct sunlight.
- C. Storage Trailers:
1. Provided by General Contractor or subcontractor as required.
 2. Remove at project completion and clean up area.
- D. Enclosures:
1. Provided by General Contractor.
 2. Provide temporary weather-tight enclosures for all exterior openings.
 3. Equip exterior doors with locks and closures.

- E. Toilets:
 - 1. Provided by General Contractor.
 - 2. Provide temporary sanitary facilities during construction period.
 - 3. Enclose toilet facilities for construction personnel.
 - 4. Portable units acceptable. No chemical toilets permitted.
 - 5. Do not use toilets in existing or new building.

- F. Stairs, Ladders, Ramps, etc.:
 - 1. Provided by each individual General or Prime Contractor.
 - 2. Provide temporary stairs, ladders, ramps runways, scaffolds, derricks, chutes and similar items required for proper execution of work by the trades.

- G. Project Signage:
 - 1. Provided by General Contractor.
 - 2. Provide project identification sign of wood frame and exterior grade medium density overlay plywood construction, information and graphics per Architect's design.
List title of project, Owner, Architect and Contractor. See drawings for detail, if applicable.
 - 3. Signage of individual contractors or sub-contractors will be allowed only for identification of temporary offices.
 - 4. No other signage or advertisement will be allowed on the project site.

- I. Construction Road, Parking Facilities:
 - 1. Construct entire south parking lot with stone base first

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Temporary Structures:
 - 1. Locate as directed to avoid interference with work.
 - 2. Relocate as required and as directed by Architect.
 - 3. Construct with code-approved service connections.
 - 4. Mount fire extinguishers in prominent accessible location.
 - 5. Maintain offices during construction period.
 - 6. Provide wooden steps and landing with handrail.
 - 7. Provide crushed stone walkway.
 - 2. Provide temporary concrete walks and pathways as indicated on temporary exiting plans.
Locate, relocate, and coordinate as required to accommodate phasing of work, progress of work, code and fire officials, and concerns of Owner and Architect.

- B. Temporary Enclosures:
 - 1. Erect temporary doors as soon as enclosing walls are up.
 - 2. Cover window or wall openings in advance of finishing operations when temporary heat is required.
 - 3. Replace with permanent closures as soon as possible.
 - 4. Install temporary partitions as required to control dust and moisture penetration into existing and completed spaces.
 - 5. Provide temporary protection for installed products.
 - 6. Provide temporary enclosures and fencing protection as indicated on temporary exiting plans.
Locate, relocate, and coordinate as required to accommodate phasing of work, progress of work, code and fire officials, and concerns of Owner and Architect.

- C. Temporary Toilets:
 - 1. Locate as directed in convenient location to avoid interference with project.

2. Anchor portable units to prevent dislocation.
3. Service daily.
4. Relocate as work progresses.

D. Temporary Road Construction:

1. Locate construction road and parking areas at permanent locations.
2. Incorporate temporary stone roads into final paved areas as base course.
3. Maintain roads during construction period.
4. Inspect and correct base course to specified thickness and level before paving is installed.

E. Temporary Construction Apparatus:

1. Erect Scaffolding, securely in conformance with labor laws and safety codes.
2. Construct stairs, ladders, ramps, runways and derricks security to sustain 100 psf minimum live load or as required for their use.

3.02 REMOVAL AND CLEAN UP

- A. Remove all temporary structures and materials completely upon completion of construction.
- B. Remove debris and clean area.
- C. Repair all damage and restore to finish condition.

3.03 PROTECTION

A. Safety:

1. Maintain lights and barricades on all obstruction and hazards during contract period in conformance to federal and local laws and codes.

B. Fire Protection:

1. Provide multi-purpose dry chemical extinguishers.
2. Locate one extinguisher adjacent to each stairway.
3. Wherever and whenever any burning, welding, cutting or soldering operations are in progress, or equipment is in use, or any work involving a fire hazard is performed, the Contractor or Subcontractor responsible for such operation shall have at all times acceptable fire extinguishes or protection within ten feet of the operation.

C. Piping:

1. Keep materials out of piping by capping or other protection.
2. Trades responsible for stoppage shall bear expense of cleaning.

D. Equipment:

1. Each contractor and subcontractor shall take necessary precautions to protect and secure own equipment, tools and material.

E. Surface Water Control:

1. Grade site to drain properly at all times, without accumulation of water.
2. Maintain excavations free of water. Pump excavation as required.
3. Protect site from erosion. Do not allow erosion to leave site.

END OF SECTION 01520

SECTION 01610 - PRODUCT DELIVERY AND HANDLING

PART 1- GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Section Includes:
1. Material shipments and project delivery to job site.
 2. Handling of materials and products included in project.
 3. Phasing of the work.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- Section 00700 - General Conditions.
Section 00810 - Supplementary General Conditions.
Section 01640 - Owner Furnished Equipment.

1.03 DELIVERY

- A. Delivery materials, supplies or equipment to Project site during working hours.
- B. Deliveries made during other than normal working hours must be received by an authorized agent of the Contractor.
- C. No employee of the Owner is authorized to receive any shipment designated for this project.
- D. The Owner assumes no responsibility for receiving any shipments designated for this project.
- E. Under no circumstances may shipments be directed to, or in care of, the Owner.

1.04 HANDLING

- A. All materials furnished under this Contract shall be identified, shipped, addressed, consigned, etc., to the Contractor who may be charged therewith by giving the name of the Contractor, the name of the project, the street and the city.

1.05 PHASING OF THE WORK

- A. Work may be phased, limiting installation of materials to separate areas of site or times of construction.
- B. Any and all coordination of materials on site related to phasing of the work shall be accomplished by the Contractor at no additional costs to the Owner.
- C. All materials, equipment, and associated items and components for the scope of work are to be delivered to the site only as and when needed for installation. Time allowed on site prior to installation shall be a reasonable timeframe as deemed acceptable by the Architect.
- D. All items on site shall be stored off the ground and protected by watertight encapsulating cover in preparation for immediate installation.
- E. Any and all items on site in a timeframe deemed unacceptable by the Architect for any reason, or deemed to be damaged by improper handling or storage, are to be removed from the site and returned to the manufacturer, without cost to the Owner. Products shall be replaced entirely with new materials at the time needed and deemed acceptable for installation.

END OF SECTION 01610

SECTION 01630 - PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1- GENERAL

1.01 REQUIREMENTS INCLUDED

Section Includes:

1. Contractor's options.
2. Requests for substitutions.

1.02 RELATED REQUIREMENTS FOR SUBSTITUTIONS SPECIFIED ELSEWHERE

Section 01330- Submittal Procedures.

1.03 CONTRACTOR'S OPTIONS

- A. For products specified only by referenced standards, select product meeting standards and submit for approval in accordance with this section.
- B. For products listing several manufacturers or model numbers, the following criteria apply:
 1. For specification sections naming a list of acceptable manufacturers and only one manufacturer's specific model name or number, alternate products from the list of acceptable manufacturers are acceptable only if they are equivalent to the named, specific, model name or number in all respects. If the alternate manufacturer's product is not equivalent to the named, specific, model name or number in all respects, then that manufacturer's product is not an acceptable substitution, even though they are named as an acceptable manufacturer in the specification section. Proposed products from listed alternate manufacturers with no model name or model number listed must be submitted in accordance with this section.
 2. For specification sections naming a list of acceptable manufacturers, and no specific model number from any of the listed manufacturers is named in the specification, alternate products from named manufacturers are acceptable provided that they are equivalent to the listed performance criteria and referenced standards in all respects. If the alternate manufacturer's product is not equivalent to the listed performance criteria and referenced standards in all respects, then that manufacturer's product is not an acceptable substitution, even though they are named as an acceptable manufacturer in the specification section.
 3. For specification sections naming a list of acceptable manufacturers and a number of manufacturer's specific model numbers, any of the named, specific, referenced products as listed are acceptable. Alternate products from the listed acceptable manufacturers are acceptable only if they are equivalent to at least one of the named, specific, model names or numbers in all respects. If the alternate manufacturer's product is not equivalent to at least one of the named, specific, model names or numbers in all respects, then that manufacturer's product is not an acceptable substitution, even though they are named as an acceptable manufacturer in the specification section. Proposed products from listed alternate manufacturers without a listed model name or number must be submitted in accordance with this section.
- C. For products specified by naming only one product and manufacturer, there is no option, and no substitution will be allowed. This item may have been specified in this manner to standardize the Owner's maintenance procedures or stock inventory, comply with the Owner's warranty requirements, or to maintain compatibility with existing construction. In some instances, this item may have been specified to determine a level of quality or performance desired and requests for substitutions may be accepted for consideration as determined by the Architect.

1.04 REQUESTS FOR SUBSTITUTIONS

- A. During period of bid preparation, Architect will consider written requests for substitutions, received at least ten (10) calendar days prior to bid date; requests received after that time will not be considered.
- B. Products proposed for installation by the Contractor and approved by the Architect shall not be changed except with written consent of the Architect.
- C. Submit all information to the Architect electronically via e-mail or CD, unless otherwise permitted. If hard copies are permitted, submit two (2) copies of all information.
- D. Include the following information in request.
Submittals or product catalogs without the following specific information listed will not be considered.
1. Complete data substantiating compliance of proposed substitution with Contract Documents.
 2. Product Data:
 - a. Product identification, including manufacturer's name and address.
 - b. Manufacturer's literature;
 - 1) Product description.
 - 2) Performance and test data.
 - 3) Reference standards.
 - 4) Material safety and data sheets.
 - c. Samples.
 - d. Name and address of similar projects which may be visited in vicinity of project on which product was used and date of installation.
 3. Construction Method: detailed description and drawings of proposed method.
 4. Itemized comparison of proposed substitution with product or method specified.
 5. Data relating to changes in construction schedule.
 6. Relation to separate contracts.
 7. Accurate cost data on proposed substitution in comparison with product or method specified.
 8. Literature of item proposing to replace, proving equality and comparison.
- E. In making the request for substitution, Bidder/Contractor represents:
1. They have investigated proposed product or method and determined that it is equal or superior in all respects to that specified.
 2. They will provide the same warranty requirements for substitution item as for product or method specified.
 3. They will coordinate and accommodate installation of accepted substitution into the work, making such changes as may be required for work to be complete in all respects and trades.
 4. The Bidder/Contractor waives all claims for any and all additional costs or time related to this substitution which consequently become apparent, by contractor, subcontractors, vendors, and suppliers. Bidder/Contractor shall be responsible for any and all costs, direct or indirect, resulting from this Request.
 5. Cost data is complete and includes all related costs under his Contract, but excludes:
 - a. Costs under separate contracts.
 - b. Architect's redesign costs, if any.
- F. Substitutions will not be considered if (in the opinion of the Architect):
1. Request is not received within the proper timeframe for consideration prior to the bid date.
 2. Request does not contain the proper information for determination of substitution.
 3. Item has been specified with no substitutions permitted.
 4. Item is not considered to be equal to that specified.
 5. Item would require substantial revision to the Contract Documents or design intent.

6. Item would have an adverse effect on the project or construction schedule.
 7. Item would have an adverse effect on other trades or scope of work.
 8. Item is deemed unacceptable by the Owner for any reason.
 9. Item is deemed not equal to the desired aesthetic or have an adverse aesthetic effect; including colors, textures, patterns or appearance specified or intended.
 10. They are indicated or implied on shop drawings or project data submittal without formal request submitted in accordance with this Section.
 11. They have not been included in an addendum during bidding.
 12. They are made after award of Contract.
- G. It is the responsibility of the bidder to make a complete and proper submission for their request for substitution, to the correct party as indicated in the specifications and within the required timeframe. The Architect is not responsible for any errors in the bidders submission, including such items as sending information to the incorrect contact person, or sending the request to the incorrect mailing address, fax number or e-mail address.
- H. The decision of the Architect is FINAL.

END OF SECTION 01630

SECTION 01640 - OWNER-FURNISHED EQUIPMENT

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Section Includes:

1. Description of work.
2. Definitions.
3. Protection and Cleaning.
4. Building Systems.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

Section 01110 - Summary of Work - Single Contract
Section 01130 - General Construction Requirements

1.03 DESCRIPTION OF WORK

- A. Coordinate the installation of the equipment or system with all trades. Any problem noted shall be brought to the attention of the Architect. This notification must be submitted in writing and no claims for additional work shall be considered unless the request for clarification has been initiated by the Contractor.
- B. Work includes installation of owner furnished items as noted on drawings and coordination of owner installed items with owner's representatives, and vendors and suppliers.

1.04 DEFINITIONS

A. OFCI: (Owner Furnished - Contractor Installed)

1. The Owner shall be responsible for furnishing equipment or system for installation by Contractor.
2. The Contractor shall be responsible for receiving, storing, protecting, providing all rough-in services, installing and testing of the equipment or system. The Contractor shall receive, inventory, verify quantity and condition and notify the Owner of any discrepancies or damage. The Contractor shall provide coordination, blocking, connections and all provisions necessary to fully incorporate into the project, scope, building and site.

B. CFCI: (Contractor Furnished - Contractor Installed)

1. The Contractor shall be responsible for ordering, receiving, storing, protecting, installing and testing of the equipment or system.
2. Unless otherwise noted, ALL work shown on drawings and specified is C.F.C.I.

C. OFOI: (Owner Furnished - Owner Installed)

1. The Owner shall be responsible for furnishing and installing this equipment or system.
2. The Contractor shall be required to furnish any rough-ins as shown on the Contract Documents, and cooperate with the Owner and their vendors to coordinate this work with work of the Contract.

1.05 PROTECTION & CLEANING

1. Contractor shall protect and clean all O.F.C.I. items, treating them the same as if they had been purchased by the contractor.

END OF SECTION 01640

SECTION 01732 - CUTTING AND PATCHING

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Section Includes:

1. Make several parts fit properly.
2. Uncover work to provide for installation of ill-timed work.
3. Remove and replace defective work.
4. Remove and replace work not conforming with requirements of Contract Documents.
5. Remove samples of installed work as specified for testing.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

Section 01110- Summary of Work - Single Contract.

Section 01740- Cleaning.

PART 2 - PRODUCTS

2.01 MATERIALS

For replacement of work removed: Comply with Specifications.

PART 3 - EXECUTION

3.01 PREPARATION

A. General:

1. Do not endanger any other work by cutting or altering work or any part of it.
2. Do not cut or alter work of another contractor without the written consent of Architect.
3. Patching and refinishing shall be executed by the trade experienced in such finishing work.

B. Prior to cutting:

1. Provide shoring, bracing and support as required to maintain structural integrity of project.
2. Provide protection for other portions of project.
3. Provide protection from elements.

3.02 PERFORMANCE

- A. Execute cutting and demolition by methods which will prevent damage to other work and will provide proper surfaces to receive installation of repairs and new work.
- B. Execute excavating and backfilling by methods which will prevent damage to other work and will prevent settlement.
- C. Execute fitting and adjustment of products to provide a finished installation to comply with specified tolerances, finishes.
- D. Cut existing concrete openings for piping, floor drains, etc., by core drilling.
- E. Employ original installer to perform cutting and patching for exposed finished surfaces.
- F. Restore work which has been cut or removed; install new products to provide completed work in accord with requirements of Contract Documents.

- H. Contractor is responsible for cost to restore or patch adjacent surfaces to original condition.
- I. Fit work airtight to pipes, sleeves, ducts, conduits and other penetrations.
- J. Refinish entire surface as necessary to provide an even finish.
 - 1. Continuous surfaces: To nearest intersections.
 - 2. Assembly: Entire refinishing.

END OF SECTION 01732

SECTION 01740 - CLEANING

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Section Includes:
1. Description of general cleaning requirements.
 2. Regulatory agency requirements.
 3. Cleaning during construction.
 4. Final Cleaning.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Cleaning for Specific Products of Work:
Specification Section for that work, including Divisions 15 and 16.

1.03 DESCRIPTION

- A. The General Contractor is responsible for all cleaning unless specifically noted otherwise.
- B. Maintain premises and public properties free from accumulations of waste, debris, and rubbish, caused by operations.
- C. Remove temporary piping and wiring: by respective contractors.
- D. At completion of work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all sight-exposed surface; leave project clean and ready for occupancy.

1.04 REGULATORY AGENCY REQUIREMENTS

- A. Maintain project in accord with Occupational Safety & Health Act of 1970 as amended, in terms of clean up.
- B. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
1. Do not burn or bury rubbish and waste materials on project site.
 2. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary drains, or bury below ground.

PART 2 - PRODUCTS

2.01 MATERIAL

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacture.

PART 3 - EXECUTION

3.01 CLEANING DURING CONSTRUCTION

- A. Execute cleaning to insure that building, grounds and public properties are maintained free from accumulations of waste material and rubbish on a daily basis by all trades.
- B. Wet down dry materials and rubbish to lay dust and prevent blowing dust.

- C. At reasonable intervals during progress of Work, clean site and public properties, and dispose of waste materials, debris and rubbish.
- D. Provide on-site containers for collection of waste materials, debris and rubbish.
- E. Remove waste materials, debris and rubbish from site and legally dispose of at public or private dumping areas off Owner's property.
- F. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
- G. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.
- H. Ensure that no construction materials or items are accessible to public on site or grounds.

3.02 FINAL CLEANING

- A. Employ experienced workman or professional cleaners for final cleaning.
- B. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
- C. Remove grease, dust, dirt, stains, labels, fingerprints and other foreign materials from sight-exposed interior and exterior finished surfaces; polish surfaces so designated to shine finish.
- D. Wash and clean all glass, removing labels.
- E. Clean and polish fixtures, equipment and materials.
- F. Repair, patch and touch-up marred surfaces to specified finish, to match adjacent surfaces.
- G. Vacuum all carpeted areas; wax and polish all tile and resilient flooring areas.
- H. Remove all foreign materials from roof and site area.
- I. Broom clean paved surfaces; rake clean other surfaces of grounds.
- J. Each Prime Contractor shall be responsible for cleaning all equipment installed by the respective contractors.
- K. Mechanical and Electrical Work:
 - 1. Respective contractors shall perform cleaning of their equipment.
 - 2. Mechanical contractor shall clean all strainers in his respective piping work.
 - 3. Replace throw-away type air conditioning filters or media if units were operated during construction, or clean ducts, blowers and coils if air conditioning units were operated without filters.
 - 4. This does not include replacing filters used for performance testing and balancing.
 - 5. Replace burned out or inoperative pilot and lighting lamps; by contractor furnishing respective equipment or fixture.
 - 6. Replace all bulbs in fixtures used for temporary lighting during construction.

- L. Conduct final cleaning and preparation of surfaces and materials as per manufacturer's recommendation and in strict accordance with manufacturer's guidelines.
- M. All materials and finishes shall be stripped, waxed, polished, buffed, etc., upon Substantial Completion for their use by Owner.
- N. Owner will assume responsibility for cleaning as time designated on Certificate of Substantial Completion, Conditional Acceptance or partial occupancy, whichever is first, for Owner's acceptance of Project or portion thereof.

END OF SECTION 01740

SECTION 01770 - CLOSEOUT PROCEDURES

PART 1- GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Section Includes:
1. Administrative procedures in closing out the work.
 2. Procedures for Substantial Completion.
 3. Procedures for Final Inspection.
 4. Required contractor guarantees.
 5. Evidence of payments and release of liens.
 6. Final adjustment of accounts.
 7. Final Application and Certificate for Payment.
 8. Post construction inspection.
 9. Closeout submittals required are specified in Section 01780.
 10. Closeout maintenance materials required are specified in Section 01781.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- Section 00700 - General Conditions.
- Section 00810 - Supplementary General Conditions.
- Section 00500 - Agreement Form.
- Section 01110 - Summary of Work - Single Contract.
- Section 01220 - Contingency Allowance.
- Section 01740 - Cleaning.
- Section 01780 - Closeout Submittals.

1.03 SUBSTANTIAL COMPLETION

- A. Submit written certification to Architect that project or designated portion of project is substantially complete and ready for use by Owner.
- B. Architect will make an inspection within a reasonable time after receipt of such notice. The Contractor is responsible for the final punchlist inspection in accordance with the General Conditions. No inspection by the Architect will be made until the Contractor submits written certification that the punchlist has been issued and complete. The Architect's Substantial Completion inspection is not for the purpose of preparing a "to-do" list for the Contractor to use in finishing the work. If it becomes apparent at the time of the Substantial Completion inspection that items affecting life safety, accessibility, security, or full intended use of space are not complete, the inspection will be terminated and the Contractor will be liable for the costs of re-inspection.
- C. Should Architect consider that work is not substantially complete:
1. Architect shall immediately notify Contractor, in writing, stating reasons.
 2. Contractor to remedy deficiencies and send second written notice of substantial completion to Architect.
 3. Architect will re-inspect Work.
 4. Contractor to pay costs of Architect's re-inspection.
- D. When Architect/Engineer considers that work is substantially complete; Architect will prepare and issue a Certificate of Substantial Completion, AIA Document G704, complete with signatures of Owner and Contractor, accompanied by Contractor's list of items to be completed or corrected ("Punchlist") as verified and amended by the Architect. Retainage amounts will be adjusted per General Conditions and Supplementary General Conditions.

1.04 FINAL INSPECTION

- A. Contractor shall submit written certification that:
 - 1. Contract Documents have been reviewed.
 - 2. Work has been completed and inspected in accordance with Contract Documents.
 - 3. Equipment and systems have been tested in presence of Owner's representative and are operational.
 - 4. Work is completed, and ready for final inspection.
 - 5. If any items from the Certificate of Substantial Completion Inspection are not completed, the final inspection will be terminated and the Contractor will be liable for the costs of re-inspection.
- B. Architect will make final inspection after receipt of certification.
- C. Should Architect consider that work is incomplete or defective:
 - 1. He shall promptly notify Contractor, in writing, stating reasons.
 - 2. Contractor shall take immediate steps to remedy the stated deficiencies, and send second written notice to Architect/Engineer certifying that Work is complete.
 - 3. Architect will re-inspect Work.
 - 4. Contractor to pay costs of Architect's re-inspection.
 - 5. Final payment will not be released.
- D. When Architect finds that work is acceptable in accordance with Contract Documents, he shall request contractor to prepare Project Closeout Submittals in accordance with Section 01780.

1.05 GUARANTEES

- A. Contractor agrees to make good all damage to the construction of building or site or equipment which in the opinion of the Architect is a result of or incidental to the use of materials, equipment or workmanship which are inferior, defective or not in accordance with the specifications.
- B. In case repairs become necessary, the Owner will give written notice to the Contractor to make same and in case of failure of the Contractor to commence such repairs within 30 days after such notice, the Owner may make the repairs either by its own employees or by independent contract and may thereupon recover from the Contractor and his Sureties the cost of the repairs so made together with the cost of supervision and inspection thereof. The Owner will have sixty (60) days after the expiration of said guarantee period in which to notify the Contractor of any such repairs necessary on the date of such expiration. The determination of the necessity for repairs shall rest entirely with the Architect whose decision upon the matter shall be final and obligatory upon the Contractor.
- C. The Guarantees herein stipulated shall extend to the whole body of the improvement and all its appurtenances.

1.06 EVIDENCE OF PAYMENTS AND RELEASE OF LIENS

- A. Contractor to execute and submit:
 - 1. Contractor's Affidavit of Payment of Debts and Claims (AIA Document G706).
 - 2. Contractor's Affidavit of Release of Liens (AIA Document G706A)
 - 3. Consent of Surety to Final Payment (AIA Document G707).
- B. All submittals shall be duly executed before delivery to Architect.

1.07 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit final statement of account to Architect.

- B. Statement shall reflect all adjustments:
 - 1. Original Contract Sum.
 - 2. Additions and deductions resulting from:
 - a. Change Orders.
 - b. Contingency Allowance.
 - c. Deductions for uncorrected work.
 - 3. Total Contract Sum, as adjusted.
 - 4. Previous payments.
 - 5. Sum remaining due.

- C. Architect will prepare final Change Order reflecting approved adjustments to Contract Sum not previously made by Change Orders or Allowance Adjustments.

1.08 FINAL APPLICATION AND CERTIFICATE FOR PAYMENT:

- A. Contractor shall submit final application in accordance with procedures and requirements of General and Supplementary Conditions prior to submission of Final Application and Certificate for Payment.

- B. Architect will review Final Application and issue Final Certificate in accordance with provisions of General Conditions.

- C. Should final completion be materially delayed through no fault of Contractor, Architect may issue a Semi-Final Certificate for Payment in accordance with provisions of General Conditions.

1.09 POST CONSTRUCTION INSPECTION

- A. Prior to expiration of one year from date of Substantial Completion, Architect may make visual inspection of Project in company with Owner and Contractor to determine whether correction of Work is required in accordance with provisions of General Conditions.

- B. For Guarantee beyond one year Architect may make inspections at request of Owner after notification to Contractor.

- C. Architect will promptly notify Contractor, in writing, of any observed deficiencies.

- D. Any/all corrections to work at that time to be at Contractor's expense.

END OF SECTION 01770

SECTION 01780 - CLOSEOUT SUBMITTALS

PART 1- GENERAL

1.01 REQUIREMENTS INCLUDED

A. Section Includes:

1. Operation and Maintenance Manuals.
2. Product Warranties.
3. Project Record Documents (As-Built Drawings).
4. Spare-Parts.
5. Certificates of Inspection.
6. Food Service Equipment Maintenance Manuals.
7. Keys and Keying Schedule.
8. Instruction of Owner's Personnel.
9. Certificate of Occupancy.
10. Certification of Asbestos and Lead-Based Paint.
11. Closeout maintenance materials required are specified in Section 01781.

B. Unless specifically permitted by the Architect, the Contractor is to provide all items listed herein to the Owner via the Architect prior to the date of Substantial Completion.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

Section 00700 - General Conditions.
Section 00810 - Supplementary General Conditions.
Section 01110 - Summary of Work - Single Contract.
Section 01130 - General Construction Requirements.
Section 01320 - Construction Progress Documentation.
Section 01770 - Closeout Procedures.
Respective Specification Sections.

1.03 OPERATION AND MAINTENANCE MANUALS

A. Submission Requirements:

1. Furnish Owner with all manual information electronically on CD in PDF format.
2. Furnish Owner with two (2) sets of bound hard copy manuals.
3. Submit to Architect for review of information and forwarding to Owner for Owner's records.

B. Preparation:

1. Prepare data by personnel experienced in maintenance and operation of described products.
2. Obtain information directly from manufacturer of equipment or product.

C. Format:

1. Prepare organization of data in the format of an instructional manual.
2. Cover:
 - a. Identify manual with title OPERATION AND MAINTENANCE MANUAL.
 - b. Identify title of Project.
 - c. Identify subject matter of contents.
3. Organization:
 - a. Divide sections for each separate product and system, with description of product and major component parts of equipment.
 - b. For any hard copies required, provide tabbed dividers between each section.

4. Text:
 - a. Include all manufacturer's published data and product cutsheets.
 - b. For any hard copies required, provide on 20 pound paper.
 5. Drawings:
 - a. Provide applicable drawing files from manufacturer or Architect's drawing files as required. Contact Architect to obtain PDF drawing files as needed.
 - b. For any hard copies required, provide with reinforced punched binder tab. Bind in with text. Fold larger drawings to size of text pages.
 6. Binders (for any hard copies required):
 - a. Commercial quality, 8-1/2 x 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size.
 - b. When multiple binders are used, correlate data into related consistent groupings.
- D. Contents:
1. Table of Contents:

Provide title of Project; names, addresses, and telephone numbers of Architect/Engineer, Subconsultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.
 2. For Each Product or System:

List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
 3. Product Data:

Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
 4. Drawings:

Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
 5. Typed Text:

As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.
 6. Warranties:

Include a copy of each.
 7. Reports:

Include a copy of all test reports, certificates, testing and balance data, etc.
- E. Manual for Materials and Finishes:
1. Building Products, Applied Materials, and Finishes:

Include product data, with catalog number, size, composition, and color and texture designations. Provide information for re-ordering custom manufactured Products.
 2. Instructions for Care and Maintenance:

Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
 3. Moisture Protection and Weather Exposed Products:

Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
 4. Additional Requirements:

As specified in individual Product specification Sections.
 5. Provide a list of all materials and finishes with scanned photo files or actual samples of all products.

- F. Manual for Equipment and Systems:
1. Each Item of Equipment and Each System:
Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.
 2. Panelboard Circuit Directories:
Provide electrical service characteristics, controls, and communications; typed.
 3. Operating Procedures:
Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
 4. Maintenance Requirements:
Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
 5. Include color coded wiring diagrams as installed.
 6. Provide servicing and lubrication schedule, and list of lubricants required.
 7. Include manufacturer's published operation and maintenance instructions.
 8. Include sequence of operation by controls manufacturer.
 9. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
 10. Provide control diagrams by controls manufacturer as installed.
 11. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.
 12. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
 13. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
 14. Include test and balancing reports as specified in Section 15990 - Testing, Adjusting and Balancing.
 15. Additional Requirements as specified in individual Product specification Sections.
 16. Provide a list of design data, settings, setpoints, etc., as applicable for equipment.

1.04 PRODUCT WARRANTIES

- A. Submission Requirements:
1. Furnish Owner with all warranty information electronically on CD in PDF format.
 2. Furnish Owner with two (2) sets of bound hard copy warranties.
 3. Submit to Architect for review of information and forwarding to Owner for Owner's records.
- B. Preparation:
1. Gather Warranties required for specific Products or Work as specified in each individual Section.
 2. Obtain information directly from responsible Subcontractor, supplier, and manufacturer of equipment or product within 10 days after completion of applicable item of Work.
 3. Except for items put into use with Architect approval, leave date of beginning of time of warranty until the Date of Final Acceptance is determined.
 4. Verify that documents are in proper form, are complete, contain full information, are notarized, and are fully executed and valid.
 5. Co-execute submittals when required.
 6. Retain warranties until time specified for submittal.

- C. Format:
1. Prepare organization of data in the format of an instructional manual.
 2. Cover:
 - a. Identify manual with title WARRANTIES.
 - b. Identify title of Project.
 - c. Identify subject matter of contents.
 3. Organization:
 - a. Separate each warranty keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary.
 - b. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
 - c. For any hard copies required, provide tabbed dividers between each warranty.
 4. Binders (for any hard copies required):
 - a. Commercial quality, 8-1/2 x 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size.
 - b. When multiple binders are used, correlate data into related consistent groupings.
- D. Contents, Each Volume:
1. Table of Contents:

Neatly typed, in sequence of Table of Contents of Project Manual, with each item identified with number and title of specification Section in which specified, and name of Product or Work item.
- E. Time of Submittals:
1. For equipment or component parts of equipment put into service during construction with Architects approval, submit documents within 10 days after acceptance.
 2. Make other submittals within 10 days after Date of Final Completion, prior to final Application for Payment.
 3. For items of Work for which acceptance is delayed beyond Date of Final Completion, submit within 10 days after acceptance.

1.05 PROJECT RECORD DRAWINGS ("AS-BUILTS")

- A. Submission Requirements:
1. Furnish Owner with original record document prints.
 2. Furnish Owner with one (1) additional hard copy set of record document prints.
 3. Furnish Owner with all as-built information electronically on CD in PDF format.
 4. Submit to Architect for review of information and forwarding to Owner for Owner's records.
- B. Project Record Documents required:
1. Marked-up copies of Contract Drawings.
 2. Marked-up copies of Shop Drawings.
 3. Marked-up copies of Specifications, addenda and Contract Modifications.
 4. Marked-up Product Data submittals.
 5. Field records for variable and concealed conditions.
 6. Record information on Work that is recorded only schematically.
- C. Maintenance of Documents:
- Store record documents in field office apart from Contract Documents used for construction. Do not permit Project Record Documents to be used for construction purposes. Maintain and protect record documents from damage in a clean, dry, legible condition. Make documents available at all times for inspection by Architect.

- D. Record Drawings:
1. During construction, maintain a set of black-line white-prints of Contract Drawings and Shop Drawings for Project Record Document purposes.
 - a. Mark these Drawings to indicate actual installation where installation varies from installation shown originally. Give particular attention to information on concealed elements which would be difficult to identify or measure and record later. Items required to be marked include but are not limited to:
 - 1) Dimensional changes to Drawings.
 - 2) Revisions to details shown on Drawings.
 - 3) Depths of foundations below first floor.
 - 4) Locations and depths of underground utilities.
 - 5) Revisions to routing of piping and conduits.
 - 6) Revisions to electrical circuitry.
 - 7) Actual equipment locations.
 - 8) Duct size and routing.
 - 9) Locations of concealed internal utilities.
 - 10) Changes made by Contract Modification.
 - 11) Details not on original Contract Drawings.
 - b. Responsibility for Markup and Supervision:
Contractor Quality Control Representative; as specified in Section 01400 - Quality Control. Where feasible, individual or entity who obtained record data, whether individual or entity is installer, subcontractor, or similar entity, is required to prepare mark-up on Record Drawings.
 - 1) Accurately record information in an understandable Drawing technique.
 - 2) Record data as soon as possible after it has been obtained. In case of concealed installations, record and check mark-up prior to concealment.
 - 3) Contractor Quality Control Representative: Affix signature and certify accuracy of Record Drawings.
 - c. Mark completely and accurately record prints of Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions. Where Shop Drawings are marked, show cross-reference on Contract Drawings location.
 - d. Mark record sets with red erasable colored pencil; use other colors to distinguish between changes for different categories of Work at same location.
 - e. Mark important additional information which was either shown schematically or omitted from original Drawings.
 - f. Note construction change directive numbers, alternate numbers, Contract Modification numbers and similar identification.
 - g. At time of Final Acceptance, submit record Drawings to Architect for Owner records. Organize into sets, bind and label sets for Owner's continued use.
 2. Preparation of Transparencies:
 - a. Immediately prior to inspection for Final Acceptance, review completed marked-up record Drawings with Architect. When authorized, prepare a full set of corrected transparencies of Contract Drawings and Shop Drawings.
 - b. Incorporate changes and additional information previously marked on print sets. Erase, redraw, and add details and notations where applicable. Identify and date each Drawing; include printed designation "PROJECT RECORD DRAWINGS" in a prominent location on each Drawing.
 - c. Refer instances of uncertainty to Architect for resolution.
 - d. One set of transparencies of original Contract Drawings will be furnished to Contractor by the Owner for use in recording changes and additional information. Other printing as required is Contractor's responsibility.

- e. Review of Transparencies:
Before copying and distributing, submit corrected transparencies and original marked-up prints to Architect for review. When acceptable, Architect will initial and date each transparency, indicating acceptance of general scope of changes and additional information recorded, and of quality of drafting.
 - f. Transparencies and original marked-up prints will be returned to Contractor for organizing into sets, printing, binding and final submittal.
3. Copies and Distribution:
After completing preparation of transparency Record Drawings, print (three) 3 black-line prints of each Drawing, whether or not changes and additional information were recorded. Organize copies into manageable sets. Bind each set with durable paper cover sheets, with appropriate identification, including titles, dates and other information on cover sheets.
- a. Organize and bind original marked-up set of prints that were maintained during construction in same manner.
 - b. Organize record transparencies into sets matching print sets. Place each set in durable tube-type Drawing containers with end caps. Mark end cap of each container with suitable identification.

E. Additional Record Submittals:

- 1. Refer to other specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Immediately prior to Final Acceptance, complete additional records and place in order, properly identified and bound or filed, ready for use and reference. Submit to Architect.
 - a. Categories of requirements resulting in miscellaneous records include, but are not limited to the following:
 - 1) Field records on excavations and foundations.
 - 2) Field records on underground construction and similar Work.
 - 3) Survey showing locations and elevations of underground lines.
 - 4) Inverted elevations of drainage piping.
 - 5) Survey establishing building lines and levels.
 - 6) Authorized measurements utilizing unit prices or allowances.
 - 7) Records of plant treatment.
 - 8) Ambient and substrate condition tests.
 - 9) Certifications received in lieu of labels on bulk products.
 - 10) Batch mixing and bulk delivery records.
 - 11) Testing and qualification of tradesmen.
 - 12) Documented qualification of installation firms.
 - 13) Load and performance testing.
 - 14) Inspections and certifications by governing authorities.
 - 15) Leakage and water-penetration tests.
 - 16) Fire resistance and flame spread test results.
 - 17) Final inspection and correction procedures.

1.06 SPARE-PARTS

- A. Provide Products, replacement stock, spare parts, maintenance, and extra materials in quantities specified in individual specification Sections.
- B. Deliver to Project Site and place in location as directed by Architect; obtain receipt prior to Final Payment.

1.07 CERTIFICATES OF INSPECTION

- A. General.
- B. Plumbing.
- C. HVAC.
- D. Electrical.
- E. Fire Sprinkler.
- F. Fire Alarm.
- G. Exhaust Hood.

1.08 FOOD SERVICE EQUIPMENT MAINTENANCE MANUALS:

- A. Furnish Owner with three (3) separately bound "Food Facilities Equipment Maintenance Manual" for all kitchen equipment, exhaust hoods and specialties. Submit manual to Architect for review and forward to Owner.
- B. Instructions for maintenance of food facilities equipment, including the following:
 - 1. Care of finished surfaces.
 - 2. Spare parts lists.
 - 3. Data Sheets.
 - 4. Period of warranty and date warranty goes into effect.
 - 5. List of service agencies responsible for each item of equipment including fabricated equipment.
 - 6. Food Service Equipment Contractor's name and telephone number.

1.09 KEYS

- A. Submit keys and keying schedule to Owner.

1.10 INSTRUCTION OF OWNER'S PERSONNEL

- A. Prior to final inspection or acceptance, fully instruct Owner's designated operating and maintenance personnel in the operation, adjustment, and maintenance of all products, equipment and systems.
- B. Such instructions shall occur at a time designated by the Architect/Engineer at the completion of the job at a meeting set up by the contractor and attended by the representatives of the Owner and manufacturer.
- C. Services of factory instructor or representative to teach Owner's representative on operation of equipment will be arranged by the contractor, shall begin after equipment has been placed in satisfactory operating condition and shall continue for a period of time as deemed necessary by the Architect.
- D. Contractor shall verify in writing that such periods of instruction have been held with the Owner's representative.
- E. Minimum length of training session to be two (2) hours.
- F. Session will need to be videotaped by Contractor for use by Owner.

1.11 CERTIFICATE OF OCCUPANCY

- A. Where the Local Authority of Location of project requires either temporary or permanent Certificate of Occupancy, obtain and pay for Certificates and furnish a copy to the Architect for forwarding to the Owner.
- B. Contractor to verify requirements with Local Building Officials.

1.12 CERTIFICATION OF ASBESTOS MATERIAL AND LEAD-BASED PAINT

- A. The use of asbestos containing materials, in excess of 1 percent as defined by applicable US Environmental Protection Agency regulations, is prohibited in the project.
- B. The use of lead-based paint is prohibited in the project.
- C. Prepare and submit to the Architect the "Certification of Asbestos and Lead-Based Paint (Existing Building) " for existing buildings or portions of buildings (attached).
- D. Prepare and submit to Architect the "Certification of Asbestos and Lead-Based Paint (New Work) " for new material furnished or installed as part of the Work (attached).

END OF SECTION 01780

Certification of Asbestos and Lead-Based Paint
(Existing Building)

To: Kovert Hawkins Architects, Inc.
Subject: Certification for a building built after 1990
Facility name: _____
Facility address: _____

Certification for existing building:

I / We certify under penalty of perjury under the laws of the United States that the following is true and correct. This building was constructed after 1990 and is free of asbestos containing material in excess of 1 percent as defined by applicable US Environmental Protection Agency regulations, and lead-based paint except as specifically listed below. This certification includes all areas of the building(s), including but not limited to; the roof and flooring.

Owner name: _____

Signature: _____

Address: _____

Telephone: _____ Date executed: _____

Materials containing asbestos/lead-based paint	Location/room within facility

The penalty for making a false statement is prescribed by 18 USC 1001.

Certificate of Asbestos and Lead-Based Paint

(New Work)

To: Kovert Hawkins Architects, Inc.

Subject: Certification for new construction

Facility name:

Facility address:

Certification for new construction:

This Contractor hereby certifies that no asbestos-containing material in excess of 1 percent as defined by applicable US Environmental Protection Agency regulations, and lead-based paint has been furnished or installed at the referenced project.

Contractor name:

Signature:

Address:

Telephone: _____

Date executed: _____

The penalty for making a false statement is prescribed by 18 USC 1001.

SECTION 01781 - CLOSEOUT MAINTENANCE MATERIALS

PART 1- GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Section Includes:
1. Maintenance Materials.
 2. Owner Verification.

1.02 MAINTENANCE MATERIALS

- A. General Requirements:
1. No maintenance stock to be used by the Contractor for any reason.
 2. Provide maintenance stock for each and every style, type or color specified for each product.
 3. Provide maintenance stock at end of the project and directly to the Owner.
 4. Wrap and protect all materials for storage by the Owner.
 5. Packages and containers to be manufacturer's unopened and unsealed packaging.
If quantities listed exceed a manufacturer's single container, additional unopened and unsealed containers shall be supplied until minimum quantity is met.
 6. Packages and containers shall include manufacturer's label and product information.
 7. Paint products shall include manufacturer's color and mix formulas.
- B. Acoustical Ceiling Tile:
1. Provide to Owner maintenance stock of at least (24) tiles.
- C. Rubber Base:
1. Provide to Owner maintenance stock of at least (10) linear feet.
- D. Paint:
1. Provide to Owner maintenance stock of at least (2) unopened gallon containers.

1.03 OWNER VERIFICATION

- A. Owner to sign-off receipt of each item.
- B. Provide to Architect, copy of this Specification Section with Owner's signature next to each item listed, verifying that they have been received by the Owner's representative and entered into their stock.

END OF SECTION 01781

SECTION 02010 - SUBSURFACE EXPLORATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Sub-Surface Exploration Report:

1. Prepared by: **ALT & WITZIG ENGINEERING, INC.**
4105 WEST 99TH STREET
CARMEL, INDIANA 46032
317-875-7000 (P)
317-876-3705 (F)

2. Report is intended for informational purposes of interpolating and understanding subsurface conditions of the project site, and becomes a part of the Contract Documents.

B. Boring Logs:

1. Included for Contractor's information, but not a warranty of subsurface conditions.

C. Representations or Warranties:

1. None are made by the inclusion of this report.
2. Neither the Owner nor the Architect//Engineer will be responsible for interpretations or conclusions drawn from this report by the Contractor.
3. Data is made available solely for the convenience of the Contractor.

D. Additional Investigation:

1. Contractor should visit the site to acquaint himself with site conditions.

END OF SECTION 02010

**SUBSURFACE INVESTIGATION &
GEOTECHNICAL RECOMMENDATIONS**

**AGRICULTURAL TRAINING CENTER
SEYMOUR COMMUNITY SCHOOLS
SEYMOUR, INDIANA
A&W PROJECT No.: 16IN0040**

**PREPARED FOR:
KOVERT HAWKINS ARCHITECTS
JEFFERSONVILLE, INDIANA**

**PREPARED BY:
ALT & WITZIG ENGINEERING, INC.
GEOTECHNICAL DIVISION**

FEBRUARY 11, 2016



Alt & Witzig Engineering, Inc.

4105 West 99th Street • Carmel, Indiana 46032
(317) 875-7000 • Fax (317) 876-3705

February 11, 2016

Kovert Hawkins Architects
630 Walnut Street
Jeffersonville, Indiana 47130
Attn: Mr. Hal Kovert

Report of Subsurface Investigation and Geotechnical Recommendations

RE: Agricultural Training Center
Seymour Community Schools
Seymour, Indiana
Alt & Witzig File: 16IN0040

Dear Mr. Kovert:

In compliance with your request, we have conducted a subsurface investigation and geotechnical evaluation for the above referenced project. It is our pleasure to transmit one (1) electronic copy of the report.

The results of our test borings and laboratory tests completed to date are presented in the appendix of the report. Our recommendations for the project are presented in the “Geotechnical Analysis and Recommendations” section of the report.

Often, because of design and construction details that occur on a project, questions arise concerning the soil conditions. If we can give further service in these matters, please contact us at your convenience.



Very truly yours,
Alt & Witzig Engineering, Inc.

Daniel E. Desper, E.I.

David C. Harness, P.E.

Offices:

Cincinnati, Ohio • Dayton, Ohio
Indianapolis • Evansville • Ft. Wayne • Lafayette • South Bend • Terre Haute, Indiana

*Subsurface Investigation and Foundation Engineering
Construction Materials Testing and Inspection
Environmental Services*



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- Recommended Specifications for Compacted Fills and Backfills
- Site Location Map
- Boring Location Map
- Boring Logs
- General Notes

APPENDIX B

- Seismic Design Parameters
- Custom Soil Resource Report for Jackson County, Indiana

EXECUTIVE SUMMARY

Alt & Witzig Engineering, Inc. has performed a subsurface investigation and geotechnical analysis for the proposed Agricultural Training Center in the southeast corner of the intersection of 4th Avenue and F Avenue East in Seymour, Indiana (Site). This investigation was conducted in conformance with the scope and limitations of our proposal dated January 12, 2016 (*A&W Proposal 1601G012*). This investigation was performed for Kovert Hawkins Architects. Authorization to perform this investigation was in the form of an Alt & Witzig Engineering, Inc. proposal that was accepted by the Kovert Hawkins Architects.

In compliance with your request, we have completed a total of twelve (12) soil borings at the above referenced site for the proposed building. It is understood that a single-story building constructed as slab-on-grade utilizing precast concrete walls and steel roof joists surrounded by paved parking a drive areas.

Findings and Conclusions

The borings encountered two (2) to eight (8) inches of topsoil. Beneath the topsoil, soft to medium stiff cohesive soil exhibiting moisture contents ranging from 10.6% to 26.1% was encountered to a depth as great sixteen (16) feet underlain by loose granular soil.

At the time of this investigation, the final grade was not available. Therefore, it was assumed that final grade will be established at or near the current grade the current ground surface ranging from elevation 570 feet to elevation 573 feet. Based on the assumption, cuts and fills up to three (3) feet will be necessary to establish final grade. At the anticipated footing elevations soft and loose soils were encountered. Therefore, a low net allowable bearing pressure of 1,500 psf is recommended for design of conventional spread and continuous wall footings, respectively. To ensure proper bearing material, the base of the footings should be inspected by a representative of Alt & Witzig Engineering, Inc.

INTRODUCTION

This report presents the results of a subsurface investigation for the proposed Agricultural Training Center located in the southeast corner of the intersection of 4th Avenue and F Avenue East in Seymour, Indiana. This investigation was conducted for Kovert Hawkins Architects of Jeffersonville, Indiana. Authorization to perform this investigation was in the form of an accepted proposal prepared by Alt & Witzig Engineering, Inc. (*Alt & Witzig Proposal No. 1601G012*).

Provided plans indicated that a 150 feet long by 80 feet, 12,000 square foot, single-story slab-on-grade building will be constructed with precast concrete walls and steel roof joists. Paved parking and drive areas will be constructed surrounding the proposed building. Structural loading provided by Hal Kovert with Kovert Hawkins Architects will be on the order of 60 kips and 5 kips per lineal foot for conventional spread and continuous wall footings, respectively. It is expected that these structural loads will be transferred to the soils by conventional spread footings or continuous wall footings, if possible.

The purpose of this subsurface investigation was to determine the soil profile and the engineering characteristics of the subsurface materials in order to provide criteria for use by design engineers and architects in preparing the foundation design for the proposed structure.

The scope of this investigation included a review of geological maps of the area; a review of geologic and related literature; a reconnaissance of the immediate sites; a subsurface exploration; field and laboratory testing; and an engineering analysis and evaluation of the encountered materials.

The scope or purpose of this geotechnical investigation did not, either specifically or by implication, provide any environmental assessment of the site.

DESCRIPTION OF SITE

The site of proposed building is located in the southeast corner of the intersection of 4th Avenue and F Avenue East in Seymour, Indiana. The site may be located using the Seymour, Indiana 7-½ Minute Topographic Map in Section 30, Township 6 North, Range 6 East. The general vicinity of the site is shown on the enclosed *Site Location Map* (Appendix A). An aerial photograph of the site taken in 2015 is provided in *Exhibit 1* below.

Exhibit 1 – 2015 Aerial Photograph of Site



The ground surface of the site is a flat agricultural field at an estimated ground surface elevation of 570 feet. Drainage on the site is primarily along the ground surface into low lying areas and road side ditches. The site is currently surrounded by agricultural land, commercial structures, and the Freeman Municipal Airport further to the south.

FIELD INVESTIGATION

Boring Locations

The boring locations were provided by Hal Kovert with Kovert Hawkins Architects. The boring locations were projected onto aerials provided by the Google Earth website allowing for the correlation of the approximate latitude and longitude coordinates with each boring location. These coordinates were then assigned as waypoints and uploaded into a handheld GPS unit. Utilizing the handheld GPS unit, the locations referred to on our boring logs and presented on the *Boring Location Plan* (Appendix A), were staked in the field.

Drilling and Sampling Procedures

Drilling operations began on January 28, 2016 and were completed on January 29, 2016. At the time the majority of our field activities were completed the temperatures ranged from 28° F to 46° F.

The soil borings were drilled using a tracked vehicle-mounted rig equipped with a rotary head. Hollow-stem augers were used to advance the holes. The advancement of the borings was temporarily stopped at regular intervals in order to perform standard penetration tests in accordance with ASTM Procedure D-1586 to obtain the standard penetration value of the soil.

The standard penetration value is defined as the number of blows a 140 lb hammer, falling 30 inches, required to advance the split-spoon sampler 12 inches into the soil. The results of the standard penetration tests indicate the relative density and comparative consistency of the soils, and thereby provide a basis for estimating the relative strength and compressibility of the soil profile components.

The soil samples retained in the split-spoon sampling device as a result of the penetration tests were obtained, classified, and labeled for further laboratory investigation. Unless notified to the contrary, all samples will be disposed of two (2) months after the drilling date.

Water Level Measurements

Groundwater depths, during drilling operations, were estimated based on where water was observed on the sampling rods. Upon completion, and up to twenty-four (24) hours after the completion of drilling activities, the depth to water was measured using a 100-foot tape measure with a weighted end. It shall be noted that in granular soils, borings often experience caving or ‘plugging’ of the borehole opening due to sloughing of the granular soils after removal of the augers. The depth of cave/plug is also recorded on the Boring Logs. The depths presented on the Boring Logs are accurate only for the day on which they were recorded. The exact location of the water table shall be anticipated to fluctuate depending upon normal seasonal variations in preparation and surface runoff.

Ground Surface Elevation

Ground surface elevations were not presented at the time of this investigation. Therefore, ground surface elevations in one (1) foot contours were obtained from the Jackson County, Indiana GIS. All depths and elevations referred to in this report are referenced from the ground surface existing at the time of this report. The elevations presented on our Boring Logs were interpolated and are considered accurate to ± 1 foot.

LABORATORY INVESTIGATION

A laboratory investigation was conducted to ascertain additional pertinent engineering characteristics of the subsurface materials at the site of the proposed building. All phases of the laboratory investigation were conducted in general accordance with applicable ASTM Specifications. The laboratory testing program included:

- Visual classification of soils in accordance with ASTM D-2488.
- Moisture content determination in accordance with ASTM D-2216.
- Samples of the cohesive soil were frequently tested in unconfined compression by use of a calibrated spring testing machine.
- A pocket penetrometer was used as an aid in determining the strength of the soil.

The values of the unconfined compressive strength as determined on soil samples from the split-spoon sampling must be considered approximate recognizing the manner in which they were obtained since the split-spoon sampling techniques provide a representative but somewhat disturbed soil sample.

SUBSURFACE CONDITIONS

Regional Setting

The site of the proposed development is located within the Southern Hills and Lowlands of Indiana with ground surface elevation ranging from 570 feet to 573 feet. According to the Indiana Geological Survey, bedrock is located at an approximate elevation of 550 feet consisting of mostly siltstone with limestone lenses from the Mississippian Age. According to the *Custom Soil Resource Report for Jackson County, Indiana* published by the United States Department of Agriculture Soil Conservation Service (USDS SCS), the majority of the soils covering this site are classified as Ayrshire fine sandy loam (AzoA) and Lyles fine sandy loam (Lv1A) type soils. The *Custom Soil Resource Report for Jackson County, Indiana* has been included in Appendix B of this report.

Site-Specific Geologic Results

The types of foundation materials encountered have been visually classified and are described in detail on the *Boring Log* included in Appendix A of this report. The results of the field penetration tests, strength tests, water level observations and laboratory water contents are also presented on the *Boring Logs* in numerical form.

At the ground surface, the borings encountered two (2) to eight (8) inches of topsoil. Beneath the topsoil, soft to medium stiff cohesive soil was encountered to a depth as great sixteen (16) feet underlain by loose granular soil.

In-situ moisture content determination conducted on the cohesive soils indicated that the cohesive soils at this site exhibited moisture contents ranging from 10.6% to 26.1%.

Site-Specific Groundwater Elevations

The *Custom Soil Resource Report for Jackson County, Indiana* indicates a seasonal high groundwater ranging from the natural ground surface to one-half (½) foot below natural ground surface.

Groundwater level measurements, taken during and upon completion of the boring operations, indicated groundwater as shallow as one (1) feet below the current ground surface. Groundwater level measurements, taken up to twenty-four (24) hours after the completion of the boring operations, indicated groundwater as shallow as the current ground surface. The exact location of the water table should be anticipated to fluctuate somewhat depending upon normal seasonal variations in precipitation and surface runoff. It should be noted that the groundwater level measurements recorded on the individual *Boring Logs* included in Appendix A of this report, are accurate only for the dates on which the measurements were performed.

Seismic Parameters

Based on the field and laboratory tests performed on the encountered subsurface materials and an assumption of similar soils conditions present at depths below the boring termination depth, this site should be considered a Site Class D in accordance with the 2012 International Building Code.

Maximum spectral response acceleration values of $S_S=0.184$ g and $S_1=0.097$ g are indicated for seismic design.

GEOTECHNICAL ANALYSIS & RECOMMENDATIONS

Project Description

Provided plans indicated that a 150 feet long by 80 feet, 12,000 square foot, single-story slab-on-grade building will be constructed with precast concrete walls and steel roof joists. Paved parking and drive areas will be constructed surrounding the proposed building.

Structural loading provided by Hal Kovert with Kovert Hawkins Architects will be on the order of 60 kips and 5 kips per lineal foot for conventional spread and continuous wall footings, respectively. It is expected that these structural loads will be transferred to the soils by conventional spread footings or continuous wall footings, if possible.

Site Preparation

Excessively organic soil and loose dumped fill material on the site generally undergo high volume changes, which are detrimental to the behavior of shallow foundations, floor slabs, pavement, and fill material. Therefore, it is recommended that topsoil and loose materials be stripped from the construction areas and wasted or stockpiled for later use.

Stripping on the order of twelve (12) inches across the majority of the site is expected to remove topsoil at this site. The topsoil depths on our boring logs are not exact and may not represent variations between boring locations. Therefore, the topsoil thickness should be used for estimating purposes only. The amount of stripping will be dependent on the condition of the subgrade during earthmoving operations. A representative of Alt & Witzig Engineering, Inc. should verify the stripping depth at the time grading operations occur.

After stripping has been performed, and prior to the placement of fill material, it is recommended that the exposed subgrade be proofrolled with approved equipment to identify soft or yielding soils. It is further recommended that a representative of Alt & Witzig Engineering, Inc. be present to witness the proofroll evaluation. Any areas failing proofrolling should be remediated as determined by the owner after consultation with Alt & Witzig Engineering.

After completion of the proofroll and any necessary remediation has been completed, it is recommended that proper control of subgrade compaction and fill, and structural fill replacement be maintained by a representative of Alt & Witzig Engineering, Inc. as per the Foundation Recommendations and *Recommended Specifications for Compacted Fills and Backfills*, presented in Appendix A of this report; thus minimizing volume changes and differential settlements which are detrimental to behavior of shallow foundations, floor slabs and pavements.

Foundation Recommendations

The current ground surface ranges elevation 570 feet to elevation 573 feet. At the time of this investigation, the final grade was not available. Therefore, it was assumed that final grade will be established at or near the current grade. Based on the assumption, cuts and fills up to three (3) feet will be necessary to establish final grade.

At the anticipated footing elevations soft and loose soils were encountered. Therefore, a low net allowable bearing pressure of 1,500 psf is recommended for design of conventional spread and continuous wall footings, respectively. To ensure proper bearing material, the base of the footings should be inspected by a representative of Alt & Witzig Engineering, Inc.

The above recommended bearing pressures will help reduce differential settlements associated with footings founded on soil with varying stiffness across the building pad. Using the above-mentioned bearing pressure and recommendations for limiting settlements, total settlements of less than one (1) inch and differential settlements of one half ($\frac{1}{2}$) inch or less can be anticipated. In utilizing the above-mentioned net allowable pressures for dimensioning footings, it is necessary to consider only those loads applied above the finished floor elevation.

In order to alleviate the effects of seasonal variation in moisture content on the behavior of the footings and eliminate the effects of frost action, all exterior foundations should be founded a minimum of three (3) feet below the final grade.

Floor Slab Recommendations

In those areas where the existing grade is below the final floor elevation, a well-compacted structural fill will be necessary to raise the site to the desired grade. All fill materials may consist of onsite materials, with the exception of topsoil on the site. Other approved borrow materials may be used if proper moisture content and compaction procedures are maintained.

As mentioned previously, soft soil was encountered at shallow depths across this site. Therefore, after stripping the site and prior to the placement of fill, it is recommended that the subgrade areas be proof-rolled witnessed by a representative of Alt & Witzig Engineering, Inc. in order to detect possible unstable areas. Any area failing proof-roll shall be remediated. The method of remediation shall be determined by the owner after consult with Alt & Witzig Engineering, Inc.

After the building area has been leveled to the proper elevation, a minimum six (6) inch layer of granular material should be placed below the floor slab. It is recommended that all material placed with the intent of supporting the floor slab be compacted to 93% of the maximum dry density as determined by ASTM D-1557. Recommendations for proper filling procedures are presented in the Appendix.

Pavement Subgrade Recommendations

The strength of the cohesive subgrade soils at this site will depend upon several variables including drainage and compaction. It is extremely important that all paved areas be designed to prevent water from collecting or ponding immediately beneath the pavement. This can be accomplished by sheet draining the parking area and sloping the subgrade soils and outletting them to a drain or a ditch to allow for subgrade drainage.

For these soils to provide adequate support for pavement, it will also be necessary that the earthmoving contractor follow proper site work techniques. After stripping and prior to the placement of any fill material, the exposed subgrade should be proof-rolled with equipment approved by a representative of Alt & Witzig Engineering, Inc. This proof-rolling will assist in identifying pockets of unsuitable materials beneath exposed subgrades. Any areas failing proof-



roll should be stabilized as determined by the owner after consulting with Alt & Witzig Engineering, Inc.

CONSTRUCTION CONSIDERATIONS

Groundwater

Groundwater level measurements, taken during, upon completion, and up to twenty-four (24) hours after the completion of boring operations, indicated groundwater as shallow as the current ground surface. The *Custom Soil Resource Report for Jackson County, Indiana* indicates a seasonal high groundwater level ranging the natural ground surface to one-half ($\frac{1}{2}$) foot below natural ground surface. The exact location of the water table will fluctuate depending upon normal seasonal variations in precipitation and surface runoff.

Depending upon the time of the year and the weather conditions when the excavations are made, seepage from surface runoff may occur into shallow excavations or soften the subgrade soils. Since these foundation materials tend to loosen when exposed to free water, every effort should be made to keep the excavations dry should water be encountered. Sump pumps or other conventional dewatering procedures should be sufficient for this purpose. It is further recommended that all concrete for footings be poured the same day as the excavation is made in order to prevent the softening of foundation soils from groundwater infiltration.

STATEMENT OF LIMITATIONS

This report is solely for the use of Kovert Hawkins Architects and any reliance of this report by third parties shall be at such party's sole risk and may not contain sufficient information for purposes of other parties for other uses. This report shall only be presented in full and may not be used to support any other objectives than those set out in the scope of work, except where written approval and consent are provided by Kovert Hawkins Architects and Alt & Witzig Engineering, Inc.

An inherent limitation of any geotechnical engineering study is that conclusions must be drawn on the basis of data collected at a limited number of discrete locations. The geotechnical parameters provided in this report were developed from the information obtained from the test borings that depict subsurface conditions only at these specific locations and on the particular date indicated on the boring logs. Soil conditions at other locations may differ from conditions encountered at these boring locations and groundwater levels shall be expected to vary with time. The nature and extent of variations between the borings may not become evident until the course of construction.

The exploration and analysis reported herein is considered in sufficient detail and scope to form a reasonable basis for preliminary design. The recommendations submitted are based on the available soil information and assumed design details enumerated in this report. If actual design details differ from those specified in this report, this information should be brought to the attention of Alt & Witzig Engineering, Inc. so that it may be determined if changes in the foundation recommendations are required. If deviations from the noted subsurface conditions are encountered during construction, they should also be brought to the attention of Alt & Witzig Engineering, Inc.



APPENDIX A

Recommended Specifications for Compacted Fills and Backfills
Site Location Map
Boring Location Map
Boring Logs
General Notes

RECOMMENDED SPECIFICATIONS FOR COMPACTED FILLS AND BACKFILLS

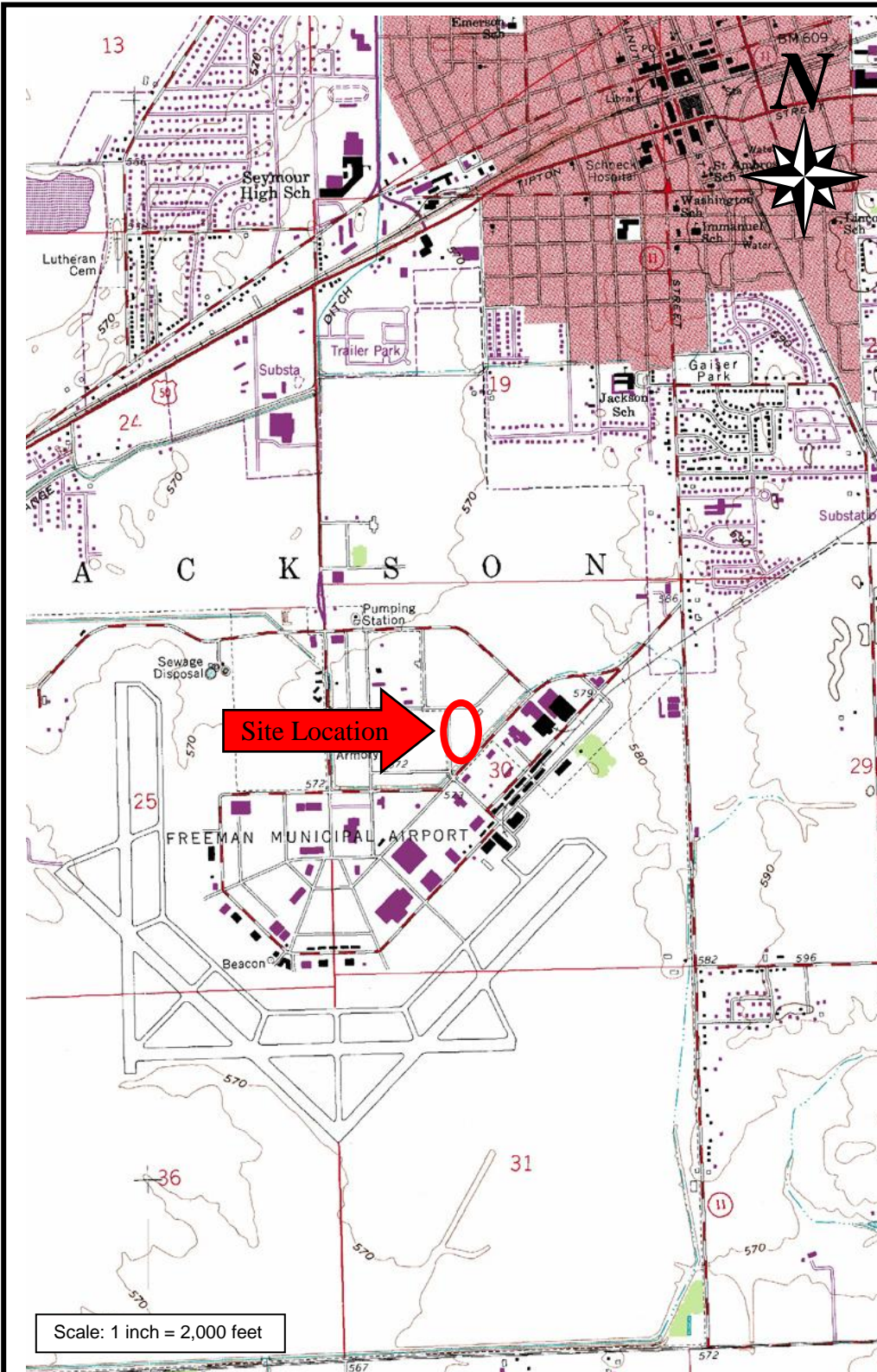
All fill shall be formed from material free of vegetable matter, rubbish, large rock, and other deleterious material. Prior to placement of fill, a sample of the proposed fill material should be submitted to Alt & Witzig Engineering, Inc. for approval.

The surface of each layer will be approximately horizontal but will be provided with sufficient longitudinal and transverse slope to provide for runoff of surface water from every point. The fill material should be placed in layers not to exceed eight (8) inches in loose thickness and should be sprinkled with water as required to secure specified compactions. Each layer should be uniformly compacted by means of suitable equipment of the type required by the materials composing the fill.

Under no circumstances should a bulldozer or similar tracked vehicles be used as compacting equipment. Material containing an excess of water so the specified compaction limits cannot be attained should be spread and dried to a moisture content that will permit proper compaction.

All fill should be compacted to the specified percent of the maximum density obtained in accordance with ASTM density Test D-1557 (95% of maximum dry density and 93% beneath floor slabs and pavements). Should the results of the in-place density tests indicate that the specified compaction limits are not obtained; the areas represented by such tests should be reworked and retested as required until the specified limits are reached.

SITE LOCATION MAP



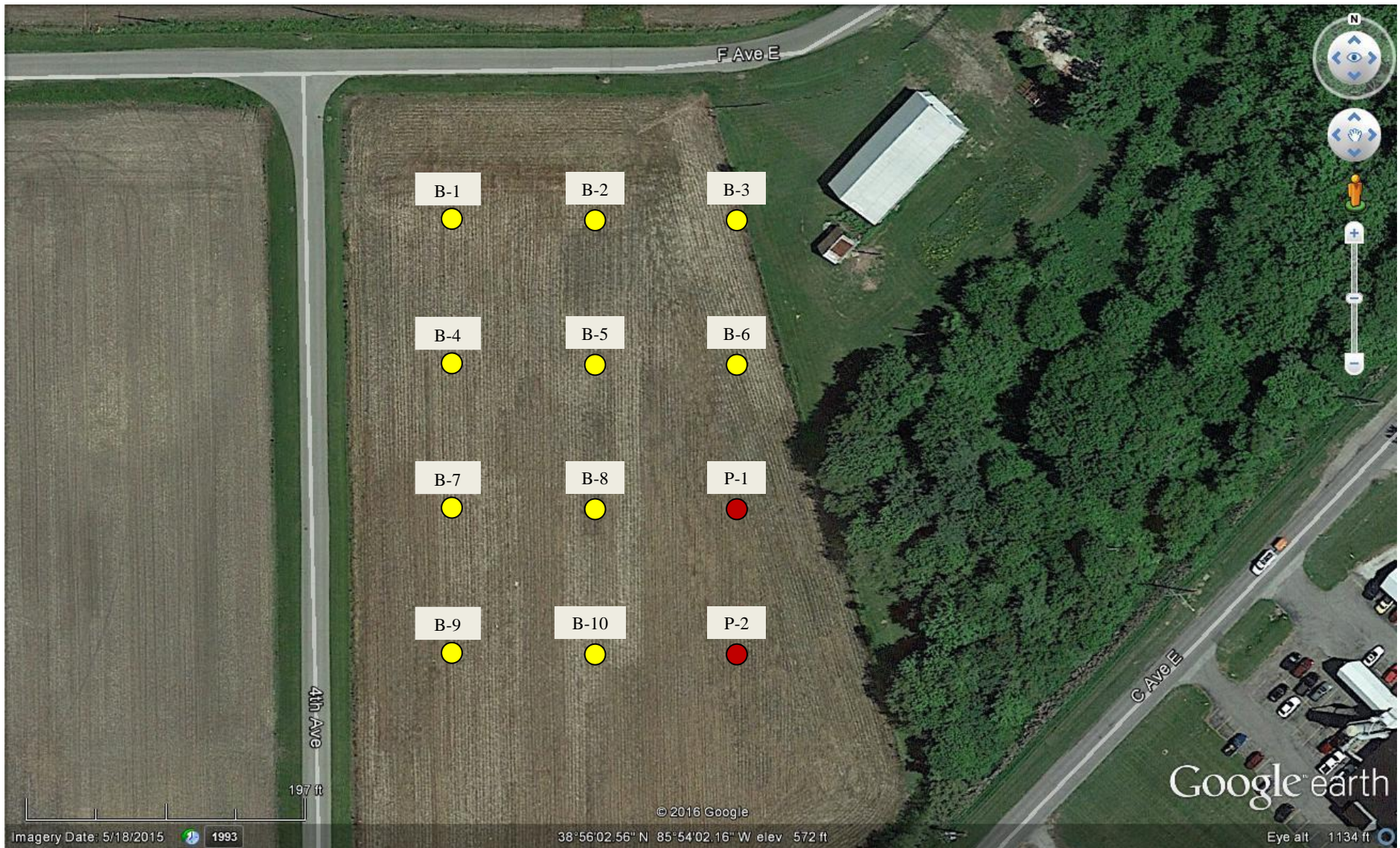
USGS Topographic Map:
Seymour Quadrangle

Township: T 6 N.
Range: R 4 E.
Section: 30

PROJECT: Agricultural Training Facility
LOCATION: 4th Ave. & F Ave. East
CLIENT: Kovert Hawkins Architects
A&W File No.: 16IN0040

A
W Alt & Witzig Engineering Inc.
 4105 W. 99th Street · Carmel, IN 46032
 TEL (317)875-7000 · FAX (317) 876-3705
www.altwitzig.com

Last Modified: 1/26/2016 9:37 AM



BORING LOCATION PLAN

PROJECT: Agricultural Training Facility
LOCATION: 4th Ave. & F Ave. East
CLIENT: Kovert Hawkins Architects
A&W File No.: 16IN0040

A
W Alt & Witzig Engineering Inc.
 4105 W. 99th Street · Carmel, IN 46032
 TEL (317)875-7000 · FAX (317) 876-3705
www.altwitzig.com



BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Kovert Hawkins Achitets
 PROJECT NAME Agricultural Training Center
 PROJECT LOCATION Seymour, IN

BORING # B-01
 ALT & WITZIG FILE # 16IN0040

DRILLING and SAMPLING INFORMATION

Date Started 1/29/16 Hammer Wt. 140 lbs.
 Date Completed 1/29/16 Hammer Drop 30 in.
 Boring Method HSA Spoon Sampler OD 2 in.
 Driller M. Loveday Rig Type D-50 Track ATV

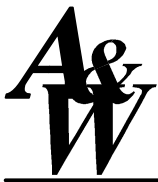
TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
570.3	TOPSOIL	0.7										
				1	SS			5		1.0	21.2	
			5	2	SS			4		0.5	21.9	
	Brown Sandy Silty CLAY			3	SS		○	9		0.5	17.9	
			10	4	SS			9		0.5	15.3	
556.5		14.5		5	SS			6				
	Brown, Wet SAND											
550.0		21.0		6	SS							
	End of Boring at 21 feet											

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Groundwater
 ○ During Drilling 8 ft.
 ∇ At Completion ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling



BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Kovert Hawkins Achitets
 PROJECT NAME Agricultural Training Center
 PROJECT LOCATION Seymour, IN

BORING # B-02
 ALT & WITZIG FILE # 16IN0040

DRILLING and SAMPLING INFORMATION

Date Started 1/29/16 Hammer Wt. 140 lbs.
 Date Completed 1/29/16 Hammer Drop 30 in.
 Boring Method HSA Spoon Sampler OD 2 in.
 Driller M. Loveday Rig Type D-50 Track ATV

TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
570.3	TOPSOIL	0.7										
				1	SS	∇		6			26.0	
	Brown Sandy CLAY		5	2	SS			5			21.3	
				3	SS			7				
561.5		9.5	10	4	SS	○		6				
	Brown, Wet Fine SAND		15	5	SS			7				
			20	6	SS			7				
550.0	End of Boring at 21 feet	21.0										

Sample Type

- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Groundwater

- During Drilling 10 ft.
- ∇ At Completion 3 ft.

Boring Method

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling



BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Kovert Hawkins Achitets
 PROJECT NAME Agricultural Training Center
 PROJECT LOCATION Seymour, IN

BORING # B-03
 ALT & WITZIG FILE # 16IN0040

DRILLING and SAMPLING INFORMATION

Date Started 1/29/16 Hammer Wt. 140 lbs.
 Date Completed 1/29/16 Hammer Drop 30 in.
 Boring Method HSA Spoon Sampler OD 2 in.
 Driller M. Loveday Rig Type D-50 Track ATV

TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
570.3	TOPSOIL	0.7										
				1	SS		∇	5		0.5	23.7	
	Brown Sandy CLAY		5	2	SS			4			21.5	
				3	SS			7				
561.0		10.0	10	4	SS		○	6				
	Brown, Wet Fine SAND		15	5	SS			6				
			20	6	SS			8				
550.0	End of Boring at 21 feet	21.0										

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Groundwater
 ○ During Drilling 10 ft.
 ∇ At Completion 3 ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling



BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Kovert Hawkins Achitets
 PROJECT NAME Agricultural Training Center
 PROJECT LOCATION Seymour, IN

BORING # B-04
 ALT & WITZIG FILE # 16IN0040

DRILLING and SAMPLING INFORMATION

Date Started 1/28/16 Hammer Wt. 140 lbs.
 Date Completed 1/28/16 Hammer Drop 30 in.
 Boring Method HSA Spoon Sampler OD 2 in.
 Driller M. Loveday Rig Type D-50 Track ATV

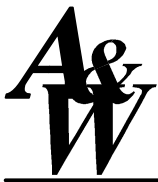
TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type Sampler Graphics Recovery Graphics Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
	SURFACE ELEVATION 570.0									
569.0	TOPSOIL	1.0								
	Brown and Gray Sandy Silty CLAY			1	SS	6		0.5	20.3	
			5	2	SS	4		0.5	20.1	
562.5			7.5	3	SS	3				
	Brown, Wet SAND with a Trace of Clay			4	SS	13				
			15	5	SS	3				
549.0			21.0	6	SS	4				2' Heave
	End of Boring at 21 feet									

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Groundwater
 ○ During Drilling 8 ft.
 ∇ At Completion 1 ft.
 ▼ After 24 hours Surface ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling



BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Kovert Hawkins Achitets
 PROJECT NAME Agricultural Training Center
 PROJECT LOCATION Seymour, IN

BORING # B-05
 ALT & WITZIG FILE # 16IN0040

DRILLING and SAMPLING INFORMATION

Date Started 1/29/16 Hammer Wt. 140 lbs.
 Date Completed 1/29/16 Hammer Drop 30 in.
 Boring Method HSA Spoon Sampler OD 2 in.
 Driller M. Loveday Rig Type D-50 Track ATV

TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
569.3	TOPSOIL	0.7					∇					
	Brown and Gray Sandy Silty CLAY		1	1	SS			6	1.8	1.0	21.5	
			2	5	SS			4		0.5	22.7	
			3		SS			5			21.1	
560.0			4	10	4	SS		10		0.5		
	Gray, Wet Fine SAND		5	15	SS			6				
549.0			6	20	6	SS		7				2' Heave
	End of Boring at 21 feet	21.0										

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Groundwater
 ○ During Drilling 11 ft.
 ∇ At Completion 1 ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling



BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Kovert Hawkins Achitets
 PROJECT NAME Agricultural Training Center
 PROJECT LOCATION Seymour, IN

BORING # B-06
 ALT & WITZIG FILE # 16IN0040

DRILLING and SAMPLING INFORMATION

Date Started 1/29/16 Hammer Wt. 140 lbs.
 Date Completed 1/29/16 Hammer Drop 30 in.
 Boring Method HSA Spoon Sampler OD 2 in.
 Driller M. Loveday Rig Type D-50 Track ATV

TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
569.3	TOPSOIL	0.7					∇					
	Brown and Gray Sandy Silty CLAY		1	1	SS			5		0.5	20.5	
			2	5	SS			4			24.0	
			3	10	SS			6			26.1	
560.0	Gray, Wet Fine SAND	10.0	4	10	SS		○	9				
			15	5	15	SS			7			
549.0	End of Boring at 21 feet	21.0	6	20	SS			7				2' Heave

Sample Type

SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Groundwater

○ During Drilling 10 ft.
 ∇ At Completion 1 ft.

Boring Method

HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling



BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Kovert Hawkins Achitets
 PROJECT NAME Agricultural Training Center
 PROJECT LOCATION Seymour, IN

BORING # B-07
 ALT & WITZIG FILE # 16IN0040

DRILLING and SAMPLING INFORMATION

Date Started 1/28/16 Hammer Wt. 140 lbs.
 Date Completed 1/28/16 Hammer Drop 30 in.
 Boring Method HSA Spoon Sampler OD 2 in.
 Driller M. Loveday Rig Type D-50 Track ATV

TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
570.3	TOPSOIL	0.7					▼					
	Brown Sandy CLAY			1	SS			6		0.5	22.3	
				2	SS			6		0.5	22.5	
563.5	Brown, Wet Fine SAND	7.5		3	SS			7				
					4	SS			16			
556.5	Gray, Wet Fine SAND	14.5		5	SS			7				
					6	SS			7			2' Heave
550.0	End of Boring at 21 feet	21.0										

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Groundwater
 ○ During Drilling 4 ft.
 ▼ At Completion 4 ft.
 ▼ After 24 hours 1 ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling



BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Kovert Hawkins Achitets
 PROJECT NAME Agricultural Training Center
 PROJECT LOCATION Seymour, IN

BORING # B-08
 ALT & WITZIG FILE # 16IN0040

DRILLING and SAMPLING INFORMATION

Date Started 1/28/16 Hammer Wt. 140 lbs.
 Date Completed 1/28/16 Hammer Drop 30 in.
 Boring Method HSA Spoon Sampler OD 2 in.
 Driller M. Loveday Rig Type D-50 Track ATV

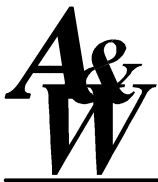
TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
570.3	TOPSOIL	0.7					▼					
				1	SS			5	2.0	1.0	25.5	
				2	SS			5			19.8	
	Brown Sandy CLAY			3	SS			7		0.5	11.4	
				4	SS			10			10.3	
				5	SS		○	10				
556.5	Gray, Wet Fine SAND	14.5		5	SS			10				
				6	SS			8				3' Heave
550.0	End of Boring at 21 feet	21.0										

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Groundwater
 ○ During Drilling 13 ft.
 ▼ At Completion 4 ft.
 ▼ After 24 hours 1 ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling



BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Kovert Hawkins Achitets
 PROJECT NAME Agricultural Training Center
 PROJECT LOCATION Seymour, IN

BORING # B-09
 ALT & WITZIG FILE # 16IN0040

DRILLING and SAMPLING INFORMATION

Date Started 1/29/16 Hammer Wt. 140 lbs.
 Date Completed 1/29/16 Hammer Drop 30 in.
 Boring Method HSA Spoon Sampler OD 2 in.
 Driller M. Loveday Rig Type D-50 Track ATV

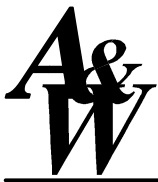
TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
571.3	TOPSOIL	0.7										
	Brown Sandy CLAY			1	SS			6		0.5	23.5	
				2	SS			6		0.5	24.8	
564.5		7.5		3	SS			7				
	Brown, Wet SAND			4	SS			10				
557.5		14.5		5	SS			7				
	Gray, Wet Fine SAND			6	SS			7				2' Heave
551.0	End of Boring at 21 feet	21.0										

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Groundwater
 ○ During Drilling 8 ft.
 ∇ At Completion 3 ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling



BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Kovert Hawkins Achitets
 PROJECT NAME Agricultural Training Center
 PROJECT LOCATION Seymour, IN

BORING # B-10
 ALT & WITZIG FILE # 16IN0040

DRILLING and SAMPLING INFORMATION

Date Started 1/28/16 Hammer Wt. 140 lbs.
 Date Completed 1/28/16 Hammer Drop 30 in.
 Boring Method HSA Spoon Sampler OD 2 in.
 Driller M. Loveday Rig Type D-50 Track ATV

TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
	SURFACE ELEVATION 572.0											
571.7	TOPSOIL	0.3										
	Brown Sandy CLAY			1	SS			6			16.8	
567.0		5.0	5	2	SS			11		0.5	18.9	
	Brown and Gray SILT											
564.5		7.5		3	SS			4			23.5	
	Gray Silty CLAY											
562.0		10.0	10	4	SS			13				
	Gray, Wet Fine SAND		15	5	SS			8				
551.0		21.0	20	6	SS			7				2' Heave
	End of Boring at 21 feet											

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Groundwater
 ○ During Drilling 8 ft.
 ∇ At Completion 3 ft.
 ▼ After 24 hours 1 ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling



BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Kovert Hawkins Achitets
 PROJECT NAME Agricultural Training Center
 PROJECT LOCATION Seymour, IN

BORING # P-01
 ALT & WITZIG FILE # 16IN0040

DRILLING and SAMPLING INFORMATION

Date Started 1/28/16 Hammer Wt. 140 lbs.
 Date Completed 1/28/16 Hammer Drop 30 in.
 Boring Method HSA Spoon Sampler OD 2 in.
 Driller M. Loveday Rig Type D-50 Track ATV

TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
	SURFACE ELEVATION 572.0											
571.8	TOPSOIL	0.2										
	Brown and Gray Sandy CLAY			1	SS			7		0.5	18.7	
567.0		5.0	5	2	SS			12				
566.0	Brown Fine SAND	6.0										
	End of Boring at 6 feet											

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Groundwater
 ○ During Drilling Dry ft.
 ∇ At Completion Dry ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling



BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Kovert Hawkins Achitets
 PROJECT NAME Agricultural Training Center
 PROJECT LOCATION Seymour, IN

BORING # P-02
 ALT & WITZIG FILE # 16IN0040

DRILLING and SAMPLING INFORMATION

Date Started 1/28/16 Hammer Wt. 140 lbs.
 Date Completed 1/28/16 Hammer Drop 30 in.
 Boring Method HSA Spoon Sampler OD 2 in.
 Driller M. Loveday Rig Type D-50 Track ATV

TEST DATA

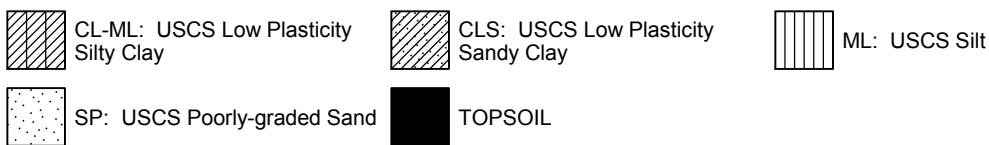
STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
	SURFACE ELEVATION 572.0											
571.8	TOPSOIL	0.2										
	Brown Sandy CLAY			1	SS			6			16.3	
567.0		5.0	5	2	SS			10				
566.0	Brown SILT	6.0										
	End of Boring at 6 feet											

Sample Type
 SS - Driven Split Spoon
 ST - Pressed Shelby Tube
 CA - Continuous Flight Auger
 RC - Rock Core
 CU - Cuttings
 CT - Continuous Tube

Groundwater
 ○ During Drilling Dry ft.
 ∇ At Completion Dry ft.

Boring Method
 HSA - Hollow Stem Augers
 CFA - Continuous Flight Augers
 DC - Driving Casing
 MD - Mud Drilling

MATERIAL GRAPHICS LEGEND



SOIL PROPERTY SYMBOLS


N: Standard "N" penetration value. Blows per foot of a 140-lb hammer falling 30" on a 2" O.D. split-spoon.
 Qu: Unconfined Compressive Strength, tsf
 PP: Pocket Penetrometer, tsf
 LL: Liquid Limit, % PL: Plastic Limit, % PI: Plasticity Index, %

DRILLING AND SAMPLING SYMBOLS

GROUNDWATER SYMBOLS

- Apparent water level noted while drilling.
- ∇ Apparent water level noted upon completion.
- ▼ Apparent water level noted upon delayed time.

SAMPLER SYMBOLS

 SS: Split Spoon

**RELATIVE DENSITY & CONSISTANCY CLASSIFICATION
(NON-COHESIVE SOILS)**

<u>TERM</u>	<u>BLOWS PER FOOT</u>
Very Loose	0 - 5
Loose	6 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	>51

**RELATIVE DENSITY & CONSISTANCY CLASSIFICATION
(COHESIVE SOILS)**

<u>TERM</u>	<u>BLOWS PER FOOT</u>
Very Soft	0 - 3
Soft	4 - 5
Medium Stiff	6 - 10
Stiff	11 - 15
Very Stiff	16 - 30
Hard	>31

GENERAL NOTES - PROJECT SPECIFIC: 16IN0040 GINT.GPJ US EVAL.GDT 2/11/16



Alt & Witzig Engineering, Inc.
 4105 West 99th St.
 Carmel, IN 46032
 Telephone: 317-875-7000
 Fax:

GENERAL NOTES

Project: Agricultural Training Center
 Location: Seymour, IN
 Number: 16IN0040



APPENDIX B

Seismic Design Parameters
Custom Soil Resource Report for Jackson County, Indiana

USGS Design Maps Summary Report

User-Specified Input

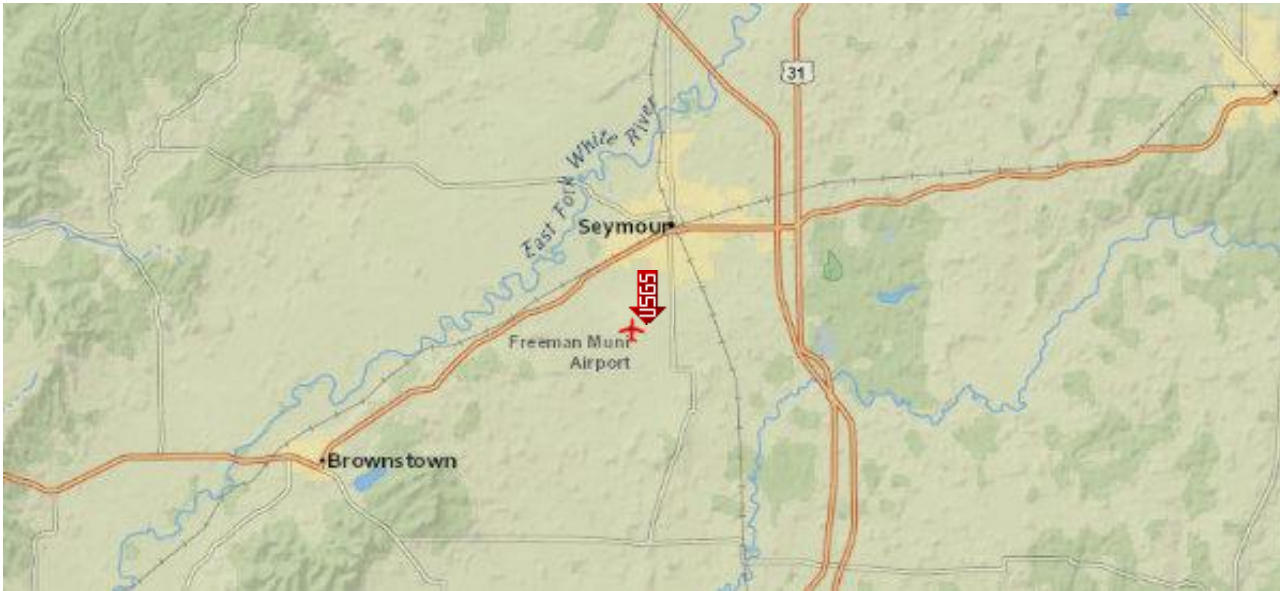
Report Title Agricultural Training Center
Tue February 2, 2016 19:43:35 UTC

Building Code Reference Document 2012 International Building Code
(which utilizes USGS hazard data available in 2008)

Site Coordinates 38.93451°N, 85.90125°W

Site Soil Classification Site Class D – “Stiff Soil”

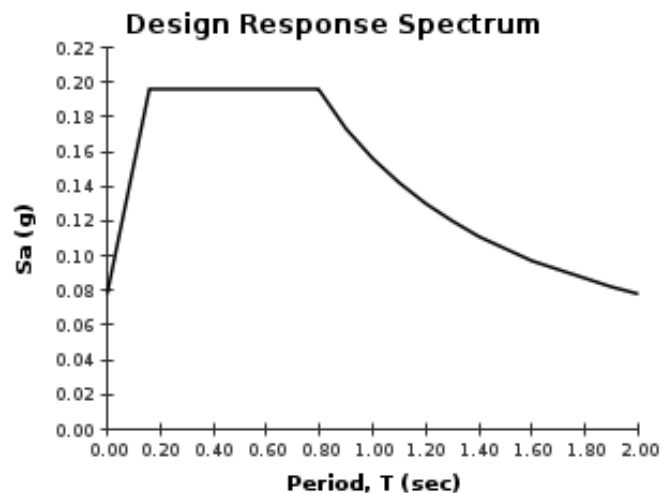
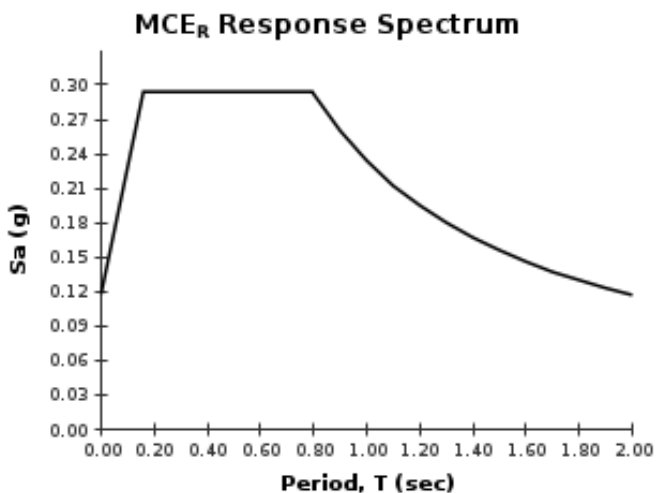
Risk Category I/II/III



USGS-Provided Output

$S_s = 0.184$ g	$S_{MS} = 0.294$ g	$S_{DS} = 0.196$ g
$S_1 = 0.097$ g	$S_{M1} = 0.234$ g	$S_{D1} = 0.156$ g

For information on how the S_s and S_1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the “2009 NEHRP” building code reference document.



Custom Soil Resource Report for **Jackson County, Indiana**



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<http://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

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individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

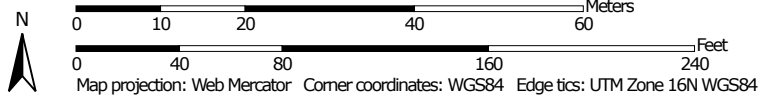
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map




Map Scale: 1:894 if printed on A portrait (8.5" x 11") sheet.




MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)




















Soils




 Soil Map Unit Polygons

 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features






-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features


Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Jackson County, Indiana
 Survey Area Data: Version 21, Sep 29, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 3, 2011—Oct 4, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Jackson County, Indiana (IN071)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AzoA	Ayrshire fine sandy loam, sandy substratum, 0 to 2 percent slopes	1.4	45.1%
LvlA	Lyles fine sandy loam, 0 to 1 percent slopes	1.7	54.9%
Totals for Area of Interest		3.1	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If

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intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Jackson County, Indiana

AzoA—Ayrshire fine sandy loam, sandy substratum, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 22121
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 45 inches
Mean annual air temperature: 52 to 56 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Ayrshire and similar soils: 88 percent
Minor components: 12 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ayrshire

Setting

Landform: Interdunes on terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Eolian sands

Typical profile

Ap - 0 to 8 inches: fine sandy loam
BE - 8 to 14 inches: fine sandy loam
Btg2 - 14 to 45 inches: fine sandy loam
BC - 45 to 70 inches: fine sandy loam
Cg2 - 70 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.60 to 2.00 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Available water storage in profile: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Other vegetative classification: Trees/Timber (Woody Vegetation)

Minor Components

Bobtown

Percent of map unit: 7 percent
Landform: Dunes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)

Lyles

Percent of map unit: 5 percent
Landform: Depressions on interdunes, depressions on stream terraces
Landform position (two-dimensional): Toeslope
Down-slope shape: Concave
Across-slope shape: Linear
Other vegetative classification: Mixed/Transitional (Mixed Native Vegetation)

LvIA—Lyles fine sandy loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 220gc
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 45 inches
Mean annual air temperature: 52 to 56 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Lyles and similar soils: 92 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lyles

Setting

Landform: Depressions on interdunes, depressions on stream terraces
Landform position (two-dimensional): Toeslope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy outwash

Typical profile

Ap - 0 to 10 inches: fine sandy loam
A - 10 to 24 inches: fine sandy loam
Bg - 24 to 51 inches: fine sandy loam
Cg - 51 to 60 inches: loamy fine sand

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Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Poorly drained

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.60 to 2.00 in/hr)

Depth to water table: About 0 to 6 inches

Frequency of flooding: None

Frequency of ponding: Frequent

Available water storage in profile: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: B/D

Other vegetative classification: Mixed/Transitional (Mixed Native Vegetation)

Minor Components

Ayrshire

Percent of map unit: 5 percent

Landform: Interdunes on terraces

Landform position (two-dimensional): Footslope, summit

Landform position (three-dimensional): Tread

Down-slope shape: Concave

Across-slope shape: Linear

Other vegetative classification: Trees/Timber (Woody Vegetation)

Lyles

Percent of map unit: 3 percent

Landform: Depressions on interdunes, depressions on stream terraces

Landform position (two-dimensional): Toeslope

Down-slope shape: Concave

Across-slope shape: Linear

Other vegetative classification: Mixed/Transitional (Mixed Native Vegetation)

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SECTION 02110 - SITE CLEARING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, supervision and services required to clear the site prior to excavation operation.
- B. Extent of site clearing is shown on drawings and/or included herein. Includes, but is not limited to:
 - 1. General requirements and preparation.
 - 2. Clearing and grubbing.
 - 3. Temporary erosion and sedimentary control measures.
 - 4. Topsoil stripping and stockpiling.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 02200 - Earthwork
- Section 02319 - Dewatering

PART 2 - PRODUCTS

2.01 EQUIPMENT

- A. Equipment used for clearing and grubbing operation shall be the contractor's option.

2.02 SOIL MATERIALS

- A. Obtain all borrow materials from off-site when unsatisfactory quality or insufficient quantity of soil materials are not available on-site.

PART 3 - EXECUTION

3.01 GENERAL

- A. All debris will be removed from the Owner's property immediately. Burning on the site will be not be permitted. Care shall be taken to keep the nuisance of trash, noise and dust at a minimum.
- B. Protect existing site improvements to remain from damage during construction activities.
- C. Damage inflicted to any/all areas which are not to receive work, shall be repaired, or replaced by the Contractor as required by the Owner and Architect/Engineer.
- D. Do not close or obstruct streets, sidewalks, drives, or other adjacent occupied facilities without permission and approval of the Owner, Architect/Engineer, and Legal Authorities. Do not allow parking or storage of equipment or materials in existing parking areas. Provide alternates routes around closed or obstructed traffic ways, as approved by the Owner, Architect/Engineer, and Legal Authorities.

3.02 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Notify utility locator service for the area of the project before commencing any site clearing work. Arrange with utilities for proper shut-off of any utility operations and services as required.

- C. Do not commence any site clearing work until temporary erosion and sedimentary controls measures are in place.
- D. Locate and clearly mark all trees and vegetation which is to remain, be relocated, or removed.

3.03 CLEARING AND GRUBBING

- A. Clear the project sites of cinders, fill debris, concrete slabs, curbs, and retaining walls, bituminous and aggregate pavements, compacted aggregate bases, sidewalks, curbs, drainage structures and utility distribution system as required or indicated on the Drawings, including those shown on Mechanical and Electrical Drawings.
- B. Clearing shall consist of the removal and disposal of all encumbrance to a depth of at least twenty-four inches below finished earthwork grades or pavement subgrades, whichever is used in the area under construction.
- C. No foundation walls, footings, walks or slabs remaining from any former construction are to be used for new construction. Remove all existing walks, slabs, walls, footing, foundations, and other construction encountered within the property lines to their full depth.
- D. Grubbing shall consist of the removal of sod, trees, weeds and other vegetation, stones and rocks within various work areas.
- E. Rubbish deposits, if encountered, shall be removed to their full depth under areas that are to be paved or have structures on them. Replace deposits with concrete, No. 73B crushed stone or earth borrow compacted as specified in other sections of the Specifications.
- F. Fill depressions caused by clearing and grubbing activities with satisfactory soil material unless further excavation or earthwork is indicated.

3.04 TEMPORARY EROSION AND SEDIMENTARY CONTROL MEASURES

- A. Provide temporary erosion and sedimentary control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, in accordance with the agencies and authorities having jurisdiction.
- B. Inspect, repair, and maintain erosion and sedimentary control measures during construction until permanent vegetation has been properly established.
- C. Remove erosion and sedimentary control measures and restore and stabilize areas disturbed during removal.

3.05 TOPSOIL STRIPPING AND STOCKPILING

- A. Areas to be stripped shall first be scraped clean of all brush, weeds, sod, grass, roots, and other materials that will interfere with lawn maintenance, prior to stripping of topsoil.
- B. Topsoil shall be kept reasonably free from subsoil, debris and stones larger than 2 inches in diameter.
- C. Remove topsoil, to its entire depth, from the areas within lines 4 feet outside of foundation walls of buildings, from areas to be occupied by roads and asphalt paving areas. Areas to be regraded or subject to compaction by construction traffic shall have topsoil removed to a depth of 6 inches.
- D. Stored topsoil shall be stockpiled on-site to be used for finished grading. Locate stockpiled topsoil in designated or approved locations where it will not interfere with building or utility operations.

- E. Cover stockpiled topsoil to prevent windblown dust. Temporarily seed as required for erosion and sedimentary control.

3.06 TREE REMOVAL

- A. Remove all trees and stumps from area to be occupied by new buildings, roads, and surfaced areas. Removal of trees outside these areas shall only be done as noted on drawings and approved by the Architect.
- B. All brush, stumps, wood and other refuse from the trees shall be removed by digging, including the roots.

END OF SECTION 02110

SECTION 02200 - EARTHWORK

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Work generally includes, but not by way of limitation, the following:
 - 1. The extent of earthwork is shown on drawings.
 - 2. Engineered fill for building support.
 - 3. Preparation of subgrade for foundations and slab-on-grade.
 - 4. Backfilling of trenches for utilities and services.
 - 5. Excavation and backfilling for building.
 - 6. Cut and fill of project site.
 - 7. Subgrade shall be graded to drain during the entire construction period.
 - 8. Geotextile fabric to act for soil stabilization, soil separation, weed barrier, or moisture barrier in a variety of earthwork, sitework or landscape applications.
- B. Contractor is responsible for implementing any proper means and methods necessary to complete work of this section based on normal seasonal environmental conditions.
- C. No additional compensation will be considered for contractor's assumption that work would be completed under ideal environmental conditions.
- D. Unless otherwise allowed by the Architect, it shall be assumed that all excavated rock shall be removed from the site and disposed of by the Contractor.
- E. Unless otherwise directed by the Architect, it shall be assumed that all needed materials shall be brought in from offsite and supplied and installed by the Contractor.
- F. Unless otherwise directed by the Architect, it shall be assumed that all excess materials shall be disposed of onsite by the Contractor.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 01400 - Quality Control
- Section 02110 - Site Clearing
- Division 15 - Plumbing Excavation
- Division 16 - Electrical Excavation

1.03 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.
- B. Testing and Inspection Service:
 - 1. Contractor will provide the Alt & Witzig, as the designated soils engineer, for testing and inspection service for quality control testing during all earthwork operation.
 - 2. See Section 1400 - Quality Control.

- C. Soils Engineer representative must be present to observe and perform tests at all times any soil work or earthwork activities are in progress:
 - 1. Determine suitability of materials for compacted fill, backfill and engineered fill.
 - 2. Determine preparation and placing of materials for fill, backfill and engineered fill.
 - 3. Determine maximum density of optimum moisture content for placing and compacting materials.
 - 4. Perform necessary field density tests to insure adequate compaction for fill, backfill and engineered fill, for each compacted layer of fill.
 - 5. Perform necessary field inspection of different phases of earthwork.
 - 6. Perform necessary field inspection for borrow pits.

- D. Surveyor shall verify property lines, right-of-way; establish correct levels, lines and grades; completely layout work required.

1.04 SUBMITTALS

- A. Written copy of test reports of all tests to the Architect within 48 hours.

1.05 SITE CONDITIONS

- A. Site Information:
 - 1. Data on indicated subsurface conditions are not intended as representations of warranties of accuracy of continuity between soil borings.
 - 2. It is expressly understood that neither the Owner nor its consultants will be responsible for interpretations or conclusions drawn by the Contractor. Data is made available solely for convenience of Contractor.
 - 3. Additional test boring and other exploratory operations may be made by Contractor at no cost to the Owner.

- B. Existing Utilities:
 - 1. Locate existing under ground utilities in areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
 - 2. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions and notify Architect. Cooperate with the Owner and utility companies in keeping respective services and facilities in operation.
 - 3. Do not interrupt existing utilities serving facilities occupied and used by the Owner or others, except when permitted in writing by Architect and then only after acceptable temporary utility services have been provided.
 - 4. Demolish and completely remove from Owner's property existing under ground utilities indicated to be removed or required to be removed for completion of the Work. Coordinate with utility companies for shut-off services if lines are active.

- C. Explosives:
 - 1. Explosives will not be permitted.

- D. Cut and Fill Material Quantities:
 - 1. It is expressly understood that neither the Owner, Architect or their consultants will be responsible for quantities of cut or fill required to achieve the final grades indicated on the drawings.
 - 2. Neither the Owner, Architect or their consultants will be responsible for the type of material existing on the site or its quality for use as a particular type of fill.
 - 3. The contractor is responsible for reviewing existing conditions and proposed design in detail as he determines sufficient for calculating the extent of the work and materials required.
 - 4. Contractor will be allowed to dig test holes during bidding. A minimum of 24 hours notice to owner of the anticipated locations and depths will be required.
 - 5. Contractor shall not assume a "balanced" project of cut and fill quantities.

- E. The Contractor shall consider the timing required for all earthwork for the entire project. He shall include in his bid all work and costs associated with the proper protection, procedures and materials required for the weather and environmental conditions for the time of year the work is to occur. No additional costs will be borne by the Owner, Architect or their consultants for failure by the Contractor to include these costs in the bid.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Fill:
1. Earth, free of vegetation, waste, humus, rocks, boulders, stones, bricks, batts, plaster, mortar or other debris.
 2. Broken concrete, block or brick shall not be used for fill.
 3. Rocks larger than 3 inches in any dimension shall not be used within subgrade.
 4. Plasticity index (PI) less than 35.
 5. Maximum dry density according to the Standard Proctor Compaction Test, minimum 100 pcf. Modified Proctor Compaction Test may be performed in lieu of Standard Proctor Compaction Test.
- B. Mass Backfill:
1. Suitable earth removed from the excavation, free of rocks, boulders, stones larger than 2 inches or other building materials debris.
 2. Brown sandy clays may be used for backfill around exterior of foundations.
 3. Topsoil and soil containing decomposed organic materials shall be considered suitable for topsoil fill material only.
 4. Aeration of some backfill may be required for compaction.
 5. Plasticity index (PI) less than 35.
 6. Maximum dry density according to the standard Proctor compaction test, minimum 100 pcf. Modified Proctor Compaction Test may be performed in lieu of Standard Proctor Compaction Test.
- C. Trench Backfill:
1. Sand for all typical locations.
 2. Onsite soil may be used for fill from 12 inches above pipes in grassy areas in lieu of sand. Intent is to not have sand or gravel bedding stone visible at the top of the excavation in grassy areas.
- D. Engineered Fill Inside Building:
1. Sand or crushed stone.
- E. Drainage Fill / Granular Fill:
1. Washed, evenly graded mixture of crushed stone, crushed gravel, uncrushed gravel or river gravel.
 2. Contain maximum 5% by weights, passing No. 8 sieve, 100% passing 1 inch sieve.
 3. Sand will not be an acceptable drainage fill/granular fill material.
- F. Top Soil:
1. Natural, fertile, agricultural soil, capable of sustaining vigorous plant and lawn growth.
 2. Uniform composition throughout, without admixture of subsoil.
 3. Free of stones, lumps, clods, sod, live plants and their roots, sticks and other extraneous matter.

2.02 GEOTEXTILE FABRIC

- A. Equal to: "Propex GeoSynthetics", Geotex 200ST.

- B. Description:
 - 1. Woven slit film geotextile fabric.
 - 2. Individual films shall be woven together to provide dimensional stability relative to each other.
 - 3. Resistant to ultraviolet degradation and to biological and chemical environments normally present in soils and subsurface conditions.

- C. Quality Control and Performance Standards:
 - 1. Tensile Strength: 200 lbs (ASTM D-4632).
 - 2. Elongation: 12% (ASTM D-4632).
 - 3. Puncture: 90 lbs. (ASTM D-4833).
 - 4. CBR Puncture: 700 lbs. (ASTM D-6241).
 - 5. Mullen Burst: 400 psi (ASTM D-3786).
 - 6. Trapezoidal Tear: 75 lbs. (ASTM D-4533).
 - 7. UV Resistance: 70% retained at 500 hrs (ASTM D-4355).
 - 8. Apparent Opening Size: 40 US Standard Sieve (ASTM D-4751).
 - 9. Permittivity: .05 sec (ASTM D-4491).
 - 10. Water Flow Rate: 4 gpm/ft² (ASTM D-4491).

PART 3 - EXECUTION

3.01 INSPECTION

- A. Contractor shall thoroughly review the existing conditions, prior to bidding or starting earthwork. This includes topography, soil materials, site access, etc. and the schedule requirements to complete the work of this section without delaying other trades or the overall project schedule.

- B. Review conditions of property adjacent to the site. Do not alter storm drainage, access, utilities etc. to the adjacent property without prior approval of Architect and Owner.

3.02 PROTECTION

- A. Maintain excavation banks and pit walls in a safe and stable conditions.

- B. Provide sheet piling, shoring and bracing as necessary to maintain excavation banks and pits, and for the protection of adjoining property, structures, pits and footings.

- C. Keep open excavation free of water, both surface and subterranean by use of pumps and earth damming around such excavations to throw surface water away from the excavation of any structure.

- D. Protect open excavation by lighted barricades or railings to prevent injury to personnel.

- E. Protect existing utilities, roads, pavement and structures.

3.03 PREPARATION

- A. Clearing:
 - 1. Clear areas as specified in Section 02110.
 - 2. Remove topsoil to its full depth at construction and within grading limits.
 - 3. Stock topsoil for use in finish grading operation. Do not use for fill.

- B. Provide grade stakes; maintain lines and grades. Stakes no more than 25 ft. apart along roadways, and 50 ft. maximum along drives and paved areas.
- C. Disk to depth of 6 inches below subgrade and compact to required density prior to proof-rolling.
- D. Proofroll stripped subgrade with rubber tired roller or other means approved by Architect.
- E. Clean out unsuitable pockets and fill with earth fill, compacted.
- F. Disc or blade subgrade until uniform, and compact to specified density.
- G. Do not place fill materials until subgrade excavation has been inspected and approved by Soils Engineer and Architect.

3.04 EXCAVATION

- A. Excavate true to line and grade, level at bottom.
- B. Excavate to suitable bearing subsoil as determined by Soils Engineer.
- C. Excavations shall be to the dimensions indicated plus sufficient space to permit erection of forms, shoring, masonry, and foundations and excavation inspections.
- D. Excavation below slabs and paving shall be sufficient to permit placement of subbase materials.
- E. Foundations:
 - 1. If suitable bearing is not encountered at the depth indicated on drawings for foundations, immediately notify the Architect.
 - 2. Do not proceed further until instructions are given by the Architect and required tests are completed.
 - 3. Under no conditions are footings to be placed on soft earth or fill.
- F. Footing Trenches:
 - 1. Where soil conditions permit, footing trenches may be excavated to the exact dimension of the concrete, and side forms omitted.
 - 2. Place footings and foundations upon undisturbed, firm bottoms.
 - 3. Fill with lean concrete any excess cut under footings and foundations.
- G. Provide shoring or piling as required to protect excavation banks.

3.05 ROCK EXCAVATION

- A. Definition:
 - 1. Rock is defined as stone or hard shale in original ledge, boulders over 1/2 cu. yard in volume, masonry or concrete that cannot be broken and removed by normal job equipment (power shovel 1/2 yard capacity, scoops, bulldozers), without the use of explosives or drills.
 - 2. This classification does not include material such as loose rock, concrete or other materials that can be removed by means other than drilling and blasting.
 - 3. Boulders shall be removed from excavation and stockpiled for removal from site.
- B. Measurement:
 - 1. Rock shall be stripped for measurement before excavating, and no rock excavated or loosened before measurement will be allowed or paid for as rock.

2. Measurement and payment, shall be by the number of cubic yards required to bring excavation to required surface of grade shown on drawings.
3. Owner may adjust grades should excessive rock be encountered.

C. Rock Excavation Space Allowance:

1. 18 inches outside wall lines of building, or outside of concrete work for which forms are required.
2. 4 inches below and 12 inches each side of underground pipes.
3. Outside dimensions of concrete work for which no forms are required.

D. Payment:

1. No additional compensation will be made for rock removal identified in the Geotechnical Report, using a reasonable straight interpolation of the rock elevation between borings. For purposes of rock removal, "refusal" in the boring logs is assumed to be rock.
2. Geotechnical Report indicates rock will be encountered during construction.
3. Contractor shall include in the Lump Sum Base Bid or applicable Alternate Bids, the cost of rock removal required for completion of this work throughout the entire site, based upon the Geotechnical Report.
4. Bidders may visit the site and make additional underground investigations at their discretion. Coordinate schedule and locations with Architect at least 24 hours in advance.
5. For rock encountered that could not have been reasonably foreseen based upon the Geotechnical Report, do not proceed without written permission from the Architect. If approved, payment will be made upon a unit price basis, or upon a time and material basis, whichever is less.
6. Contractor shall submit timesheets, material records and receipts, and any other supportive data requested by the Architect for determination of final approved price.

E. Explosives:

1. Explosives will not be permitted.

3.06 FILLING AND BACKFILLING

- A. Fills shall be formed of satisfactory materials placed in successive horizontal layers of approximately 6 inches in loose depth for the full width of the cross section.
- B. Proof roll all areas to receive fill.
- C. Where objectionable subgrade material is encountered and removed, fill excavated area to original ground level with suitable fill as specified, and compacted as required before starting filling operation.
- D. All material entering the fill shall be free of organic matter such as leaves, grass, roots and other objectionable material.
- E. Sprinkling:
 1. Use sprinkling wagons, pressure distributors and other approved equipment that will sufficiently distribute the water.
 2. Sufficient equipment to furnish the required water shall be available at all times.
- F. Take samples at frequent intervals of all fill materials for testing, both before and after placement and compaction. From these tests, corrections, adjustments and modifications of methods, materials and moisture content will be made to construct the fill.

- G. Construction of filled areas:
 - 1. Starting layers shall be placed in the deepest portion of the fill.
 - 2. Each lift shall be disked or treated by some other mechanical means as to insure the breaking up of any existing lumps and clods.
 - 3. As placement progresses, layers shall be constructed approximately parallel to the finished grade line.
- H. The Contractor shall be responsible for the stability of fills made under the contract and shall replace any portion which has become displaced due to carelessness or negligence on the part of the Contractor.
- I. Heavy equipment for spreading fill shall not be used closer to structures than a distance equal to the height of backfill above top of footing.
- J. Backfilling shall not be done until walls are braced or shored.
- K. If fill is to be provided on both sides of walls, fill on both sides at same time.
- L. Drainage fill under floor slabs on grade shall be placed to indicated depths not less than 4 inches.
- M. Fill excess cuts under slabs with drainage fill and thoroughly compact.
- N. Dispose of all excess fill offsite.
- O. Provide acceptable fill from off site if necessary to meet finish grades indicated, at no additional cost to Owner.
- P. If sand is used for engineered fill inside the building, provide a layer of geotextile fabric at bottom over subgrade and a layer over top prior to installation of drainage fill.

3.07 COMPACTION

- A. Fill areas shall be compacted using equipment capable of compacting each lift its full depth. Moisture during compaction operations shall be maintained at optimum content.
- B. Compacting equipment shall be approved equipment of such design, weight and quantity to obtain the required density in accordance with soil compaction specification.
- C. Add moisture or aerate material as necessary to achieve optimum moisture content.
- D. Compaction operations shall be continued until the fill is compacted to not less than the following percent of the maximum dry density as determined in accordance with ASTM D-1557.
 - 1. 100% in fill areas supporting footings.
 - 2. 95% in non-load bearing areas within building lines.
 - 3. 95% in fill areas under paved areas.
 - 4. 85% in landscaped areas.
- E. Any areas inaccessible to a roller shall be consolidated and compacted by mechanical tampers.
- F. Operate equipment so that hardpan, cemented gravel, clay, or other chunky soil material will be broken up into small particles and become incorporated with the material in the layer.

- G. Cut areas: Disk to 6 inches below subgrade and compact to 95% of maximum dry density at optimum moisture content as determined by ASTM D698.
- H. Compaction by flooding is not acceptable.
- I. Sealing: At end of each work day of filling and compaction operation, roll surface with smooth tired vehicle to leave smooth surfaced sealed to shed all water.

3.08 GRADING

- A. Furnish, operate and maintain such equipment as is necessary to control uniform layers, sections and smoothness of grade for maximum compaction and drainage.
- B. Rough Grading:
 - 1. Even grade to elevations 6 inches below finish grade topsoil elevations indicated.
 - 2. Protect all constructed items during grading operations, and repair if damaged.
 - 3. All areas in the project including excavated and filled sections and adjacent transition areas shall be reasonably smooth, compacted and free from irregular surface changes.
 - 4. The degree of finish shall be that ordinarily obtainable from either blade-grader or scraper operations, except as otherwise specified.
 - 5. The finished subgrade surface generally shall be not more than 0.10 feet above or below the established grade or approved cross-section, with due allowance for topsoil and sod where required.
 - 6. The tolerance for areas within 120 feet of the buildings shall not exceed 0.10 feet above or below the established subgrade.
 - 7. All ditches, swales and gutters shall be finished to drain readily.
 - 8. Unless otherwise indicated on the drawings, the subgrade shall be evenly sloped to provide drainage away from the building walls in all directions at a grade not less than 1/2 inch per foot.
 - 9. Provide roundings at top and bottom of banks and at other breaks in grade.
- C. Protection:
 - 1. Protect newly graded areas from the action of the elements.
 - 2. Any settlement or washing that occur prior to acceptance of the work shall be repaired, and grades re-established to the required elevations and slopes.
 - 3. Fill to required subgrade levels any areas where settlement occurs.
- D. Finish Grading:
 - 1. Proceed to finish elevations indicated.
 - 2. Rake subsoil clean of stones and debris. Scarify to depth of 3 inches.
 - 3. Spread stockpile topsoil over prepared subgrade to minimum depth of 6 inches, and rolled until suitable for seeding.
 - 4. Maintain surfaces and replace additional topsoil necessary to repair erosion.
- E. Continued Drainage:
 - 1. All subgrade shall be graded to continuously drain during all phases and entire duration of construction and construction activities.
 - 2. Contractor shall be held responsible for any/all detrimental site, soil and subsurface conditions created or altered as a result of improper drainage of soils and subgrade.

3.09 QUALITY CONTROL

- A. Tests of Earthwork for Paved Areas and Slabs on Grade:
 - 1. An average of one test per 6 inch lift of each 5,000 square feet area will be required.

2. The exact number of tests will depend on the weather, and be at the discretion of the Soil Engineer and approved by the Architect.
 3. Testing firms shall test and approve all material use in fill operation.
 4. Should tests indicate the required density was not attained, Contractor shall remove fill and/or backfill to depths required and as determined by the test and repeat operations until said density is attained.
- B. Quality Control of Footings:
1. Footing excavation bases will be inspected by Soils Engineer.
 2. If soft pockets are encountered, the undesirable material shall be removed.
- C. The Architect upon the recommendation of the Testing Laboratory, will have the power of rejection of materials, equipment or operating procedures which are not suitable to produce the results specified.
- D. The Contractor shall cooperate with the Testing Laboratory and shall allow the Soils Engineer ample time to conduct tests. Operation of equipment shall be discontinued when the operation interferes with testing.

SUBMITTAL CHECK LIST

1. Test results and reports of Soils Engineer/Testing Laboratory.

END OF SECTION 02200

SECTION 02280 - TERMITE CONTROL

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, supervision and services required to provide termite treatment as specified herein.

1.02 QUALITY ASSURANCE

- A. Applicators Qualifications:
 - 1. Performed by applicator licensed in the State of application.
 - 2. Minimum three (3) year's experience.

1.03 SUBMITTALS

- A. Manufacturer's Literature.
 - 1. Published data on product solution composition and use.
 - 2. Mixing and application instructions.
 - 3. Material Safety and Data Sheets (MSDS).
- B. Written warranty and guarantee.

1.04 WARRANTY

- A. Provide written warranty and insured guarantee.
- B. Effectiveness of treatment guaranteed for not less than five (5) years.
- C. If any termite activity is discovered within the warranty period, the Contractor shall re-treat structure and repair or replace all areas of damage caused, without any expense to the Owner.
- D. Guarantee to prevent and control infestations by subterranean termite species of genera:
 - 1. Coptotermes.
 - 2. Heterotermes.
 - 3. Reticulitermes.
 - 4. Zootermopsis.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Provide one of the following approved products:
 - 1. "FMC Corporation"; Prevail FT.
 - 2. "FMC Corporation"; Talstar P.
 - 3. "FMC Corporation"; Baseline Pretreat Termiticide.
 - 4. "Masterline"; Bifenthrin 7.9.
 - 5. "Nisus Corporation"; Bora-Care.
- B. Description:
 - 1. Termiticide, insecticide, fungicide.
 - 2. Water-based or borate-based chemical emulsion.
 - 3. Safe for use on wood, concrete, plastics, metals, flashings, rigid insulations, and earth.
 - 4. Shall provide a continuous barrier that termites cannot cross and eliminate wood as a food source.

PART 3 - EXECUTION

3.01 APPLICATION

A. Areas of Treatment:

1. Treat entire under-slab area of building a minimum of two inches beyond the exterior building line.
2. Treat entire interior surface of all foundation walls and grade beams.
3. Treat all areas of building expansion joints and both sides of planned interior partitions.
4. Treat all pipe, conduit and plumbing penetrations through the exterior walls.
5. Treat all pipe, conduit and plumbing penetrations through the floor slab.

B. Rate of Application:

1. Apply treatment in strict accordance with the manufacturer's published rates of application.
2. Vary rates of application at each condition of use as per the manufacturer.

SUBMITTAL CHECK LIST

1. Manufacturer's Literature.
2. Written warranty and guarantee.

END OF SECTION 02280

SECTION 02370 - EROSION CONTROL

PART 1 - GENERAL

1.01 RULE 5 SUBMITTAL

The Architect, Owner, or a consultant of the Architect or Owner, will be responsible for:

- A. Preparation of Erosion Control Plan and details to meet the requirements of the local Soil & Water Conservation District (SWCD) and the Indiana Department of Natural Resources (IDNR).
- B. Submittal of Erosion Control Plan and details to the local SWCD for review and approval.
- C. Filing of the Notice of Intent (NOI) and related required documents with the local SWCD and IDNR.

1.02 WORK INCLUDED

- A. Implementation of all work included in the approved Erosion Control Plan to meet the requirements of the local SWCD and IDNR.
- B. Contact the local SWCD and IDNR for review and approval for commencement of site work activities.
- C. Filing of any and all required documents and notices with the local SWCD and IDNR prior to the commencement of site work activities.
- D. Publication of required notices prior to the commencement of site work activities.
- E. Furnish and install erosion control materials and procedures as required by the local SWCD and IDNR.
- F. Maintain the erosion control systems and procedures throughout the project, including corrections of any and all measures following rain, storms or other inclement weather.
- G. Notify Architect when scope of all site work and erosion control work is complete for filing of the Notification of Completion (NOC) with the local SWCD and IDNR.

1.03 RELATED WORK SPECIFIED ELSEWHERE

Section 02110 - Site Clearing
Section 02200 - Earthwork

1.04 SUBMITTALS

- A. Manufacturer's product data and cutsheets for all products listed herein.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Quick Growing Grasses:
 - 1. Wheat, rye or oats.
 - 2. Integrally seeded stabilization mats.
- B. Straw Bales:
 - 1. Free of weed seed.
 - 2. 2 inch x 2 inch x 48 inch wood stakes.
- C. Silt Fence:
 - 1. Geotextile fabric and staking system.
- D. Rock Check Dam:
 - 1. Crushed limestone.
- E. Engineered Fill:
 - 1. Cohesive and stable earth as described above, suitable for bearing.
- F. Temporary Mulch:
 - 1. Loose straw crimped into soil.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Thoroughly review existing site conditions prior to bidding or starting earthwork.
- B. Review conditions of property adjacent to the site. Do not alter storm drainage, access, utilities etc. to the adjacent property without prior approval of Architect and Owner.

3.02 IMPLEMENTATION

- A. Maintain excavation banks and pit walls in a safe and stable condition.
- B. Maintain temporary erosion control systems installed to control siltation at all times throughout the work. Provide maintenance or additional work within 48 hours of notification by local IDNR official.
- C. Install permanent erosion control measures as soon as possible.
- D. Protect open excavation by lighted barricades or railings to prevent injury to personnel.

SUBMITTAL CHECK LIST

- 1. Manufacturer's product data and cutsheets.

END OF SECTION 02370

SECTION 02510 - ASPHALT CONCRETE PAVING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, supervision and services required to complete the asphalt concrete paving work indicated, noted, and detailed on the drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 02200 - Earthwork.
Section 02720 - Site Drainage.
Section 02750 - Concrete Paving.

1.03 QUALITY ASSURANCE

- A. Provide final surface of uniform texture conforming to required grades and cross sections.
- B. Surface smoothness, when tested with 10 ft. Straight-edge:
1. Base: 1/4 inch in 10 ft. maximum.
 2. Binder Course: 1/4 inch in 10 ft. maximum.
 3. Surface Course: 1/8 inch in 10 ft. maximum.

1.04 REFERENCES

- A. Publications of the following institutes, associations, societies, and agencies are referred to this Section.
1. Indiana Department of Highways, Standards Specifications, Latest Edition, IDH.
 2. American Society for Testing and Materials, ASTM.

1.05 SUBMITTALS

- A. Prior to starting any asphalt concrete paving work, prepare a preliminary Job-Mix formula for all asphalt paving to be used in this project.
1. Submit preliminary Job-Mix formula to the Architect for review a minimum of 15 days before asphalt concrete paving is required.

1.06 SITE CONDITIONS

- A. Ambient Air Temperature (Degrees Fahrenheit).
1. Base/Binder Course - 35°F minimum.
 2. Surface Course - 45°F minimum.
 3. Marking Paint - 40°F - 95°F.
- B. No binder course or surface course shall be applied to wet surfaces.
Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure.
- C. Lane marking paint shall only be applied to clean, dry surfaces.
- D. Surface course shall NOT be applied after October 15 or before May 1.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General:
 - 1. Use locally available materials and gradations which exhibit a satisfactory record of previous installations.

- B. Dense Graded Aggregate (DGA):
 - 1. Graded aggregate and water mixed.
 - 2. Meet requirements of IDH Standard Specification, Section 303.

- C. Course Aggregate:
 - 1. Sound, angular crushed stone, crushed gravel, or cured crushed blast-furnace slag.
 - 2. ASTM D692.
 - 3. Meet requirements of IDH Standard Specification, Section 903.02.

- D. Fine Aggregate:
 - 1. Sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.
 - 2. ASTM D1073.
 - 3. Meet requirement of IDH Standard Specification; Section 903.01.

- E. Asphalt Cement:
 - 1. Prepared by the refining of petroleum.
 - 2. Viscosity grade: PG 64-22.
 - 3. AASHTO M 320 or AASHTO MP 1a.
 - 4. Meet requirements of IDH Standard Specification, Section 902.01.

- F. Lane Marking Paint:
 - 1. Equal to:
 - a. "MPI"; #32 Alkyd Traffic Marking Paint.
 - b. "MPI"; #97 Latex Traffic Marking Paint (only where alkyd paints are not permitted).
 - 2. Factory Mixed, quick drying and non-bleeding alkyd oil based paint.
 - 3. FS TT-P-115, Type III.
 - 4. Color:
 - a. White (typical striping locations).
 - b. Yellow (where indicated on Drawings).
 - c. ADA blue at all handicap spaces and access aisles.

2.02 TABLE OF COMPOSITION LIMITS

<u>Sieve Size</u>	<u>Percent Passing by Weight</u>	
	<u>Binder</u>	<u>Surface</u>
1 inch	100	100
3/4 inch	90 - 95	100
1/2 inch	70 - 92	100
3/8 inch	50 - 76	85 - 95
No. 4	35 - 40	55 - 70
No. 8	18 - 45	30 - 65
No. 16	10 - 36	15 - 50
No. 30	6 - 26	8 - 40
No. 50	2 - 18	3 - 25
No. 100	0 - 11	0 - 15

No. 200	0 - 5	0 - 4
Asphalt Content	4.0 - 6.0	4.5 - 6.5
Course Aggregate Size	No. 8 & 11	No. 11
Fine Aggregate	L.S. Sand	Sand

PART 3 - EXECUTION

3.01 GENERAL

- A. Subgrade shall be proof-rolled using pneumatic tired roller capable of exerting minimum 90 psi pressure uniformly over the subgrade surface.
 - 1. Proof-rolling shall provide two complete coverages.
 - 2. Remove and replace soft spots with stable material, compact and re-proof.
 - 3. Do not proof-roll wet or saturated surfaces.
- B. Proceed with paving only after all unsatisfactory subsurface conditions have been corrected.
- C. All materials shall be spread using approved spreading equipment. Tailgating of aggregates directly onto subgrades will not be acceptable.
 - 1. Asphalt pavers shall be self-propelled with receiving hopper of sufficient capacity to provide a uniform spreading operation.
 - 2. Rollers shall be steel wheeled weighing 10 ton or three wheeled rollers with bearing of 300 pounds per linear inch width of rear wheels.
- D. Contractor shall have on hand at the site prior to paving operation all necessary portable and hand tools and one stand-by roller.

3.02 COMPACTION

- A. Subgrade and compacted base courses shall be compacted to 95% of maximum dry density in accordance with ASTM D698.
 - 1. Each lift of aggregate base shall be compacted to density specified above.
 - 2. Soft spots found during proof-rolling which are replaced with fill material shall be compacted to density specified above.

3.03 SURFACE PREPARATION

- A. Remove loose material from base surface immediately before applying prime coat.

3.04 SPREADING AND ROLLING

- A. Base Course, Compacted Stone Aggregates, and DGA:
 - 1. Spread and compact in separate lifts, maximum 4 inches each, see details for depths.
 - 2. Extend lower lift 4 inches beyond next lift.
- B. Binder Course:
 - 1. Spread and roll to minimum finish depths indicate on details.
 - 2. Spread mixture at minimum temperature of 250°F.
- C. Surface Course:
 - 1. Spread and roll to minimum finish depths indicated on details.
 - 2. Finish installation shall be true to line and grade and within 1/2 inches of true elevation.

3.05 STRIPING PAINT

- A. Cleaning: Sweep and clean surface to eliminate loose materials and dust.

- B. Striping: Use alkyd-oil traffic lane-marking paint, factory-mixed, quick-drying, and non-bleeding.
- C. Apply paint with mechanical equipment to produce uniform straight edges.
Apply in 2 coats at manufacturer's recommended rates to form 4 inches minimum width lines.
- D. Handicap parking spaces shall be white symbol on an ADA Blue background.

3.06 DENSITY TESTS

- A. Take density tests at each lift as directed by the Architect.
- B. Tests shall be made by a soils engineer approved by the Architect.
 - 1. A total of at least four (4) tests will be required at various times and locations for subgrade and base course for paved areas.
 - 2. Provide results of each test to the Architect within 72 hours after tests are made.
 - 3. Include cost of tests as outlined above in the contract amount.

SUBMITTAL CHECK LIST

- 1. Asphalt Paving Mix Formula.
- 2. Density Test Results.

END OF SECTION 02510

SECTION 02710 - WATER DISTRIBUTION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Domestic water system pipe and fittings.
- B. Connection of domestic water system to municipal water system
- C. Indiana-American Water Company:
 - 1. Will tap existing water main on south side of street
 - 2. Will furnish and install water line to north side of street
 - 3. Will furnish and install meter pit
 - 4. Will furnish and install meter
- D. All costs associated with all permits, connection fees, survey documentation, as-built drawings, third-party tapping contractor if required by utility company, overtime if utility requires service interruption outside regular work hours, and like costs and scope of work.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 02200 - Earthwork
- Section 02720 - Site Drainage
- Section 02730 - Sanitary Sewage

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM D 1785 - Specification for Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80 and 120.
 - 2. ASTM D 2241 - Specification for Polyvinyl Chloride (PVC) Pressure Rated Pipe (SDR Series).
 - 3. ASTM D 3139 - Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals.

1.04 DEFINITIONS

- A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.05 SUBMITTALS

- A. Product Data for each type of pipe, pipe fitting, valve and accessory.

PART 2 - PRODUCTS

2.01 PIPE

- A. Pipe sizes less than 3 inches that are installed below grade and outside building:
 - 1. Polyvinyl Chloride (PVC) Water Pipe.
 - 2. Conform to ASTM D 2241 with an SDR 21 (Class 150) rating.
 - 3. Pipe joints shall be integrally molded bell ends in accordance with ASTM D 3139 with factory supplied elastomeric gaskets and lubricant.

2.02 GATE VALVES - 2 INCHES AND LARGER

- A. Manufacturers: Mueller Resilient Seat Gate Valves.
- B. AWWA C509, Iron Body, bronze mounted double disc, parallel seat type, non-rising stem with square nut, single wedge, resilient seat, flanged or mechanical joint ends, control rod, post indicator where noted on drawings, extension box and valve key.

2.03 BUTTERFLY VALVES - 2 INCHES AND LARGER

- A. AWWA C 504, iron body, bronze disc, resilient replaceable seat, water or lug ends, infinite position lever handle.

2.04 ACCESSORIES

- A. Provide concrete thrust blocks using concrete to provide sufficient bearing area to transmit unbalanced thrust from bends, tees, caps, or plugs to undisturbed soil without loading undisturbed soil in excess of 2,500 PSF at 100 psi water main pressure.
- B. Tracer Wire:
1. Basis of Specification: "Performance Wire and Cable, Inc.", Tracer Wire.
 2. Description:
 - a. Solid copper single conductor tracer wire insulated with a low density polyethylene (LDPE).
 - b. Designed to carry a radio signal to aid in the location of buried plastic piping.
 3. Size wire as required , 12 AWG conductor minimum.
- C. Identification:
1. Tracer wire to be terminated at the service entry to the building and exposed for access.
 - a. Interior to building: terminate for water service entry at main shut off valve and for fire service entry at riser location.
 - b. Exterior to building (when interior is not feasible): terminate above ground at point of entry of piping into building.
 2. Tag and label wire at service point termination as follows:
 - a. Domestic Water Lines: "DOMESTIC WATER SERVICE".

PART 3 - EXECUTION

3.01 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with fine aggregates.
- B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.
- C. Cut pipe ends square, ream pipe and tube ends and remove burrs.
- D. Remove scale and dirt, on inside and outside, before assembly.
- E. Prepare pipe for connections to equipment with flanges or unions.

3.02 BEDDING

- A. Excavate pipe trench and place bedding material. Provide trench wall shoring as required.
- B. Form and place concrete for pipe thrust restraints at any change of pipe direction and at fittings as indicated on Drawings.
- C. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6 inches compacted depth, each layer. Place compacted bedding material to elevation of paving subgrade.

3.03 INSTALLATION - PIPE AND FITTINGS

- A. Maintain separation of water main from sanitary and storm sewer piping in accordance with state or local codes or requirements of the Health Department.
- B. Install pipe and fittings in accordance with AWWA C600.
- C. Install pipe to allow for expansion and contraction without stressing pipe or joints or as specified by pipe manufacturer.
- D. Install access fittings in accordance with local codes to permit disinfection of water system performed under this Section.
- E. Connections with Existing Pipelines: Where connections are made between new work and existing piping, make connection using suitable fittings for conditions encountered. Make each connection with existing pipe at time and under conditions which least interfere with operation of existing pipeline and in compliance with the local utility company.
- F. Form and place concrete for thrust blocks or other specified methods of retainage at each change of direction or end of pipe main.
- G. Establish elevations of buried piping in accordance with Section 02200 for work in this Section. Provide 36" minimum cover.
- H. Backfill trench in accordance with Section 02200.
- I. Install trace wire continuous buried 10 inches below finish grade, above pipe line. Trace wire shall be in accordance with local utilities standards.

3.04 INSTALLATION - VALVES

- A. Install gate valves as indicated on Drawings and supported on concrete pads with valve stem vertical and plumb. Install valve boxes in a manner that will not transmit loads, stress, or shock to valve body. Center valve box over operating nut of valve vertical and plumb. Securely fit valve box together leaving cover flush with finished surface.

3.05 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Disinfect distribution system with chlorine before acceptance for domestic operation. Amount of chlorine shall be such as to provide dosage of not less than 50 parts/million. Thoroughly flush lines before introduction of chlorinating materials and after contact period of not less than 24 hours, system shall be flushed with clean water until residual chlorine content is not greater than 1.0 part/million. Open and close valves in lines being disinfected several times during contact period. After disinfection, take water sample and bacteriological test in accordance with AWWA specifications. Do not place distribution system in service until approval is obtained from applicable governing authorities.

3.06 SERVICE CONNECTIONS

- A. Provide water service connection in compliance with utility company requirements.

3.07 FIELD QUALITY CONTROL

A. Site Tests:

1. Compaction:
 - a. Perform inspections prior to and immediately after placing bedding.
 - b. Perform tests as specified in Section 02200.
2. Piping: Water distribution system pipe installed below grade and outside building shall be tested in accordance with following procedures:
 - a. Perform the testing of pipe materials, joints, and/or other materials incorporated into the construction of water mains and force mains to determine leakage and watertightness. All pressure pipeline shall be tested in accordance with Section 4 of AWWA C600 latest edition. In the event any state or local code requires a more stringent test, the more stringent shall apply.
 - b. Pressure Test: After the pipe has been laid, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing and not less than 1.25 times the working pressure at the highest point along the test section.
 - c. Leakage Test: The leakage test shall be conducted concurrently with the pressure test. Leakage is defined as the quantity of water that must be supplied into the newly laid pipeline, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipeline has been filled with water. Leakage shall not be measured by a drop in pressure in a test section over a period of time. No pipeline installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SDP}{133200}$$

L = allowable leakage, (gallons per hour)

S = length of pipe tested, (feet)

D = nominal diameter of pipe, (inches)

P = average test pressure during test, (psig)

- d. Visible Leakage: All visible leaks shall be repaired regardless of the amount of leakage.
- e. Acceptance of Installation: If any test of pipe laid in place discloses leakage greater than that specified, the Contractor shall, at his own expense, locate the leak and make repairs as necessary until the leakage is within the specified allowance. Contractor shall supply all water for testing at no additional cost to the Owner.
- f. Provide one copy of results of meter test and hydrostatic pressure test to Architect and utility company upon completion of water distribution backfilling operations.

SUBMITTAL CHECK LIST

1. Product data for pipe, fittings, valves, and accessories.
2. Hydrostatic pressure test.

END OF SECTION 02710

SECTION 02720 - SITE DRAINAGE

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Section Includes:

1. Perforated Drainage Tile.
2. Polyethylene Plastic Piping (HDPE).
3. PVC Piping.
4. Drainage Structures, Risers, and Inlets for Plastic Piping.
5. Grates and Covers for Plastic Piping.
6. Cast Iron Grates and Covers.
7. Culverts and Flared Ends.

- B. All costs associated with all permits, connection fees, survey documentation, as-built drawings, third-party tapping contractor if required by utility company, overtime if utility requires service interruption outside regular work hours, and like costs and scope of work.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 02200 – Earthwork.

Division 15 – Plumbing Systems.

1.03 SUBMITTALS

A. Product Data:

1. Manufacturer's product data sheets, cut sheets, specifications and materials description.
2. Manufacturer's installation and maintenance instructions.

1.04 JOB CONDITIONS

A. Do not discharge water into sanitary sewers.

B. Do not discharge water containing settleable solids into storm sewers.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Polyethylene Plastic Piping:

1. "Advanced Drainage Systems (ADS)"
2. "Prinsco".
3. "Hancor".
4. "Vericore Technologies".
5. "Haviland Drainage Products".
6. "Freedom Plastics, Inc.".

B. Grates and Covers:

1. "Neenah".
2. "Advanced Drainage Systems (ADS)".
3. "Prinsco".
4. "Freedom Plastics, Inc.".
5. "Drainage Solutions, Inc."

2.02 MATERIAL

- A. Perforated Drainage Tile:
1. Provide one of the following approved products:
 - a. "ADS" Single-Wall Pipe.
 - b. "Prinsco" Goldline.
 - c. "Haviland" Agricultural Pipe.
 2. Heavy duty, HDPE polyethylene plastic, perforated.
 3. Single wall, corrugated interior and exterior surfaces.
 4. Wrapped with manufacturer's standard "sock", heavy-duty polyester synthetic pipe wrap.
 5. AASHTO rated for typical highway loads.
 6. Soil-tight joints per AASHTO section 26.
 7. Fittings, couplings, and joints as required.
 8. Slots or circular perforations for water entry, uniformly spaced along the length and circumference of the pipe.
 9. Perforations to comply with all requirements of ASTM F-405, ASTM F-667, AASHTO M-252 (3"-10") and AASHTO M-294 (12" and larger).
- B. Polyethylene Plastic Piping (HDPE):
1. Provide one of the following approved products:
 - a. "ADS" N-12.
 - b. "Prinsco" Goldflo and Goldflo WT.
 - c. "Haviland" Smooth Flow Pipe.
 2. Heavy duty, HDPE polyethylene plastic, solid.
 3. Dual wall, corrugated exterior with smooth interior wall.
 4. AASHTO rated for typical highway loads.
 5. Soil-tight joints per AASHTO section 26.
 6. Fittings, couplings, and joints as required.
 7. To comply with all requirements of AASHTO M-252 (3"-10") and AASHTO M-294 (12" and larger). Includes test methods, dimensions, markings, etc.
 8. Minimum pipe stiffness to comply with ASTM D-2412.
 9. Pipe and fittings shall be made of polyethylene compounds which meet or exceed the requirements of Type III, Category 4 or 5, Grade P33 or P34, Class C per ASTM D-1248.
 10. Male and female pipe ends which allow the construction of overlapping, gasketed joints, shall be in accordance with ASTM D-3212.
 11. Gaskets shall be flexible, elastomeric neoprene to meet or exceed the requirements of ASTM F-477.
- C. PVC Piping:
1. Schedule 40 typical at all areas with minimum 24" cover.
 2. Schedule 80 if less than 24" cover below all drives, parking areas and like conditions.
- D. Drainage Structures, Risers, and Inlets for Plastic Piping:
1. Provide one of the following approved products:
 - a. "ADS" Nyloplast Drainage Structures.
 - b. "Freedom Plastics, Inc." Inline Drain Basin Bodies.
 2. To include PVC surface drainage basin or inline drain structure, per layout, configuration and inverts as required and/or as indicated on the Drawings.
 3. Fittings, couplings, and joints as required.
 4. Accommodate correct size and type of grate or cover for each intended condition and use.
 5. Male and female pipe ends which allow the construction of overlapping, gasketed joints, shall be in accordance with ASTM D-3212.
 6. Gaskets shall be flexible, elastomeric neoprene to meet or exceed the requirements of ASTM F-477.

- E. Covers for Plastic Piping:
 - 1. Provide one of the following approved products:
 - a. "ADS" Ductile Grates, drop-in type.
 - b. "Freedom Plastics, Inc." Ductile Grates, drop-in type.
 - c. "Neenah", Ductile Grates, drop-in type.
 - 2. Light duty (5,000 lbs. rated) in all lawn or landscape areas or concrete walk areas.
 - 3. Cleanout covers to be solid type, flat and soil tight.
 - 4. All ductile grates to conform to all requirements of ASTM A-536 grade 70-50-05.

- F. Culverts and Headwalls:
 - 1. HDPE Polyethylene, or PVC as indicated on Drawings.

PART 3 - EXECUTION

3.01 PERFORATED DRAINAGE TILE

- A. Installation shall be in accordance with manufacturer's published recommendations, local City or agency requirements and per ASTM Recommended Practice for the applicable piping material.

- B. Lay pipe to provide uniform bearing with 1/8" per foot drainage slopes, or as indicated on the Drawings.

- C. Avoid sudden offsets in flow line.

- D. Do not lay perimeter drain with bottom of tile below bottom of adjacent footing.

- E. Provide and install all couplings, fittings and accessories as required for a complete installation.

- F. Backfill pipe with granular drainage fill and per all manufacturer's specifications.

3.02 FLARED ENDS

- A. Installation shall be in accordance with manufacturer's published recommendations, local City or agency requirements and per ASTM Recommended Practice for the applicable piping material.

- B. Lay pipe to provide uniform bearing with 1/8" per foot drainage slopes, or as indicated on the Drawings.

- C. Pipe length minimum 4 feet beyond edge of drive.

3.03 STORM PIPING

- A. Installation shall be in accordance with manufacturer's published recommendations, local City or agency requirements and per ASTM Recommended Practice for the applicable piping material.

- B. Lay pipe to provide uniform bearing with 1/8" per foot drainage slopes, or as indicated on the Drawings.

- C. Provide and install all couplings, fittings and accessories as required for a complete installation.

- D. Seal all joints water tight and soil tight.

- E. Provide cleanouts as indicated on the Drawings.

- F. Backfill pipe excavation, particularly bedding, with materials and compaction per manufacturer's specifications for each condition present, to provide a water tight and soil tight system.

- G. Installation depth shall provide for a minimum cover of 1'-0".

SUBMITTAL CHECKLIST

- 1. Product Data.

END OF SECTION 02720

SECTION 02730 - SANITARY SEWAGE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, supervision, and services required to complete the following work indicated, noted, detailed on the drawings and specified herein.
- B. All costs associated with all permits, connection fees, survey documentation, as-built drawings, third-party tapping contractor if required by utility company, overtime if utility requires service interruption outside regular work hours, and like costs and scope of work.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 02200 - Earthwork
- Section 02710 - Water Distribution
- Section 02720 - Site Drainage

1.03 REFERENCES

- A. ASTM D1785 - PVC Plastic Pipe, schedule 40, 80 and 120.
- B. ASTM 02665 - PVC Plastic Drain, Waste and Vent Pipe and Fittings.

1.04 SUBMITTALS

- A. Submit manufacturer's product literature.
 - 1. Published product data sheets.
 - 2. Include date on pipe materials, pipe fittings, valves and accessories.

PART 2 - PRODUCTS

2.01 SANITARY SEWER PIPING

- A. PVC Schedule 40 or SDR-35
- B. Fittings: PVC Schedule , designed for solvent welded constructions.

PART 3 - EXECUTION

3.01 EXCAVATION AND BACKFILL

- A. Refer to Section 02200 for materials and quality control.
- B. Bottom of trench shall be shaped to give substantially uniform support to the lower third of all pipe. The full length of each section of pipe shall rest solidly upon pipe bed.

3.02 INSTALLATION

- A. Route piping in orderly manner and maintain gradient.
- B. Route piping to minimize excavation. Group piping whenever practical.
- C. Install piping to allow for expansion and contraction without stressing pipe, joints or connected equipment.
- D. Cleanouts shall be at grade and supported by a poured concrete box 24 inch x 24 inch x 12 inch thick.
- E. Establish invert elevations, slopes for drainage 1/8 inch per foot.
- F. Provide a minimum of 24" of cover.

3.03 SERVICE CONNECTIONS

- A. Provide new sanitary sewer services. Before commencing work check tap locations, invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage.

SUBMITTAL CHECK LIST

1. Product Literature.

END OF SECTION 02730

SECTION 02750 - CONCRETE PAVING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, material, equipment, special tools, supervision and services required to deliver and place all cast-in-place site concrete indicated, noted and detailed on the drawings and specified herein.
- B. Types of work in this section includes, but not limited to the following:
 - 1. Concrete aprons.
 - 2. Concrete walks.
 - 3. Reinforcing steel, anchor bolts, forms and form removal.

1.02 QUALITY ASSURANCE

- A. Comply with the following standards:
 - 1. ACI Standards (latest editions) for construction procedures. Including but not limited to:
 - a. Specifications for Structural Concrete for Buildings (ACI-301).
 - b. Recommended Practice for Hot Weather Concreting (ACI-305).
 - c. Recommended Practice for Winter Concreting (ACI-306).
 - d. Building Code Requirements for Reinforced Concrete (ACI-318-89).
 - e. Recommended practice for Field Evaluation of Compressive Test Results of Field Concrete (ACI-214).
 - 2. ASTM Standards (latest editions) for material specifications.
- B. Testing:
 - 1. Pay costs of independent testing agency approved by Architect/Engineer, tests and necessary re-testing and re-inspection.
 - 2. Perform following tests, by certified concrete field technician.
 - a. Slump tests: ASTM C 143.
 - b. Compression tests: ASTM C 31 and C 39.
 - c. Air entrainment: ASTM C 138 or C 231.
 - 3. Concrete Field Tests:
 - a. Five (5) 6 inch by 12 inch concrete cylinders shall be molded for each 50 cubic yards or each day's pour if less than 50 yards.
 - b. Cylinders shall remain undisturbed in a secure location on the site for 24 hours after which they shall be removed to the testing lab by laboratory personnel.
 - c. Two of the cylinders shall be tested at 7 days and two at 28 days.
 - d. Failure to the concrete to meet the specification requirements may result in its complete removal and replacement at the Contractor's expense.
 - e. Cost of re-test, if any, will be at the Contractor's expense.
- C. Allowable tolerances:
 - 1. Formed surfaces: Table 4.3.1, ACI 301.
 - 2. Slabs finished level: $\pm 1/4"$ of floor elevation.
 - 3. Class A finishes: True planes $\pm 1/8"$ in ten feet for troweled slabs.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Store materials to prevent contamination, deterioration, and weather damage.
- B. Deliver ready-mixed concrete to point destination in conformance to ASTM C94.

1.04 ENVIRONMENTAL REQUIREMENTS

- A. Cold Weather:
 - 1. Comply with ACI 306 when temperature is 40°F or lower.
 - 2. Maximum concrete temperature 90°F, minimum 50°F per ASTM C94.

- B. Hot Weather:
 - 1. Comply with ACI 305.
 - 2. Maximum concrete temperature 90°F.
 - 3. Protect from rapid evaporation by spraying or sheeting.

1.05 SUBMITTALS

- A. Reinforcing Steel Shop Drawings:
 - 1. Indicate all reinforcing steel sizes, locations, support locations/details, lengths laps and bend details.
 - 2. Indicate all reinforcing strengths and quantities.

- B. Concrete Mix Design:
 - 1. A separate mix design for each class and type of concrete is required.
 - a. Include literature for admixtures.
 - b. Include applicable compliance with referenced ASTM number.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Portland Cement:
 - 1. ASTM C150-71, Type I or II.

- B. Air Entraining Cement:
 - 1. ASTM C150, Type IA or IIIA.

- C. Aggregates:
 - 1. ASTM C33.
 - 2. Coarse Aggregates:
 - a. Clean, tough, durable fragments of uncrushed gravel or crushed stone free from dirt or objectionable matter.
 - b. Size: Maximum 1-1/2" at footings; 1" in slabs.
 - 3. Fine aggregate: Natural sand; clean, sound, hard, durable particles; gradation size No. 1.

- D. Water:
 - 1. Clean, free from injurious amounts of oil, acids, alkalis, organic matter or deleterious substances, potable.

- E. Admixtures:
 - 1. Air Entraining Agent: Neutralized vinsol resin solution, conforming to ASTM C260.
 - 2. Water Reducing Agent: ASTM C 494, Types as required to provide controlled setting and/or controlled rate of hardening without increase in water/cement ratio or loss in strength.
 - 3. Pozzolan: ASTM C618.
 - 4. Accelerators and retarders: ASTM C 494; permitted only upon approval of Architect/Engineer.
 - 5. Do not use calcium chloride without permission of Architect.

- F. Curing Material:
 - 1. Liquid Membrane: ASTM C 309.
 - 2. Acrylic copolymer solution, transparent, quick drying, non-yellowing.
 - 3. Compatible with flooring adhesives.
 - 4. "Kure-N-Seal" by Sonneborn or equivalent.
- G. Reinforcement:
 - 1. Bars: ASTM A 615 Grade 60.
 - 2. Welded Wire Fabric: ASTM A 185, 6 x 6 W1.4 x W1.4, or as indicated.
 - 3. Reinforcing fibers will be allowed for use in exterior walks in lieu of welded wire fabric.
- H. Expansion Joint filler:
 - 1. Closed cell polyethylene or polyurethane foam.
 - 2. "Sonocrete" by Sonneborn or equivalent.
- I. Metal Accessories:
 - 1. Spacers, chairs, ties and other devices necessary for properly assembling, placing, spacing and supporting reinforcing.
 - 2. Minimum 3/4" cover for all metal accessories.
- J. Non-Shrink Grout:
 - 1. Pre-mixed, factory packaged, non-staining, non-metallic, non-gassing mortar compound.
 - 2. ASTM C 827, C 191 and C 109.
- K. Horizontal Joint Sealants:
 - 1. Self-leveling grade/type, provide sealant with cured modulus of elasticity at 100% elongation of not more than 150 psi (ASTM D 412 test procedure), and Shore A hardness of not less than 55 (ASTM D 2240). Where nonsag grade/type is required, provide sealant with cured modulus of elasticity at 100% elongation of not more than 75 psi and Shore A hardness of 20 to 30.
 - 2. "Sonneborn", "SONOLASTIC PAVING JOINT SEALANT"

2.02 MIX DESIGNS

- A. Design mix with appropriate adjustments for air content and aggregate proportions.
- B. Air Entrainment for concrete exposed to weather: air content controlled between 4 and 6% by volume.
- C. Compressive strength at 28 days: 3500 psi.
- D. Slump: 3 in. +/- 1 in.

2.03 MIXING

- A. Measure and mix materials for ready mixed concrete in conformance with ASTM C94.
- B. Take into account free moisture in the aggregate weight.

2.04 FORMWORK

- A. Provide formwork to conform to shape, lines and dimensions of members indicated on Drawings.
- B. Construct formwork sufficiently tight to prevent leakage.
- C. Construct formwork for exposed smooth surfaces of plywood or other similar smooth material.

- D. Form coatings:
 - 1. Non-staining.
 - 2. Apply before reinforcing steel is placed.
- E. Tolerances: ACI 347.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Ensure slab subgrade is well drained, of adequate, uniform load bearing nature, and not muddy, soft or frozen.
- B. Extend the compacted stone base of the adjacent pavement section beneath the curb and/or gutter for the full width of their construction and profile, whether indicated or not on the Drawings.
- C. Dampen subgrade ahead of concreting.
- D. Test Below-slab pipes prior to casting concrete.
- E. Verify reinforcement and anchors, expansion joint material and embedded items are secured in position.
- F. All construction joints shall be keyed vertical bulkheads. No horizontal joints shall be allowed. All reinforcing shall continue through joint.
- G. The Architect or his representative shall be given 24 hours notice to inspect placement of reinforcing steel before concrete is placed.

3.02 PLACING

- A. Convey concrete from mixer to form as rapidly as practicable, by methods which will prevent segregation or loss of materials.
- B. Vertical drops: maximum three feet free fall.
- C. Place concrete as nearly as possible to its final position at a rate so it remains plastic and flows readily into position. Proceed with placing as a continuous operation until unit of construction is complete. Use vertical construction joints to avoid horizontal joints between concrete placement.
- D. Do not use retempered concrete or concrete partially hardened or contaminated with foreign material.
- E. Ensure forms and conveyance equipment is clean and free of ice, water, debris and hardened concrete.

3.03 FINISHING: CONCRETE FINISH SCHEDULE

- A. Stoops: Broom finish.
- B. Walks: Broom finish. (Hard trowel smooth at expansion and control joints).

3.04 CURING

- A. Formwork shall remain in place five (5) days before being removed. Remove all formwork in such a manner and at such time as to not damage concrete surfaces and to ensure complete safety to the structure.
- B. Slabs and other horizontal surfaces shall be moist cured for seven days or have a curing compound applied immediately following completion of finishing after water sheen has disappeared.
- C. Moist curing shall be performed by application of polyethylene sheeting per ASTM C171 or continuous wetting of burlap or other type of absorptive mat.
- D. Curing Compounds:
 - 1. Spray or brush uniformly in a single coat immediately after final finishing operation, at rate recommended by manufacturer.
 - 2. Do not use material which discolors concrete
- E. Meet requirements of hot and cold weather concreting.

3.05 PROTECTION

- A. Protect fresh concrete from heavy rains, extreme air temperatures, injurious sun, mechanical injury and other deleterious elements.
- B. If scaling occurs from failure to take protective precautions, repair or replace damaged concrete.

3.06 PATCHING

- A. Do not patch any surface until examination is made by the Architect and permission is given.

3.07 BUILT-IN WORK

- A. Coordinate all openings and chases required in the concrete work and provide all items to be cast into the concrete pour.

3.08 JOINTS

- A. Locate and construct all joints as shown on the Drawings, or if not shown, as specified herein, or if not specified, as directed by Architect.
- B. Construction Joints.
 - 1. May be substituted for control or contraction joints in slabs on grade at the indicated locations of such joints or as approved by the Architect.
 - 2. Provide keyed joints between all cast sections of slabs on grade.
- C. Control Joints:
 - 1. Depth: Minimum 1" deep using early entry dry cut saws.
 - 2. Width: Maximum 3/16".
 - 3. 10 feet on center maximum, each way, or as shown on drawings.
 - 4. Walks: as indicated on drawings, or if not indicated, at 4 feet on center or the width of the walk whichever is less.
 - 5. Walls: Size and location as shown on Drawings or 25 feet o.c. each way, whichever is less.
 - 6. Saw cut joints are not acceptable unless authorized in writing by Architect.
 - 7. Wet cut joints within 24 hours of placing.

- D. Expansion Joints:
 - 1. Install 1/2" expansion joint filler at concrete pavement joints; hold down below surface or cut the required depth for sealant.

- E. Carry reinforcement across joints in slabs except at expansion joints.

SUBMITTAL CHECK LIST

- 1. Concrete Mix Design.
- 2. Reinforcement Steel Shop Drawings.

END OF SECTION 02750

SECTION 02930 - LAWNS AND GRASSES

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, supervision and services required to complete establishment of lawns of types as follows:
 - 1. Grass Seed Mix (for general seeded areas).
- B. Sod to be provided at areas indicated on the drawings.
If not indicated, sod all banks, swales and other areas where a seeded lawn establishment is impractical.
- C. Seed all lawn areas indicated on the drawings. All areas throughout the project that are newly provided or disturbed by any grading activities are to be seeded, whether indicated or not.
See description above for areas to be sodded in lieu of seeding.
- D. Seed any areas of construction project limits where disturbed by construction activities, whether indicated or not.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 02110 - Site Clearing.
- Section 02200 - Earthwork.

1.03 QUALITY CONTROL

- A. Requirements of Regulatory Agencies:
 - 1. Indiana State Seed Law.
 - 2. Indiana Highway Commission Standard Specifications 621.02.
- B. Standards:
 - 1. Indiana Association of Nurserymen.
 - 2. American Association of Nursery Horticultural Standards.
- C. Source Quality Control:
 - 1. Producer's tests for purity and germination of seed, dated within nine months of sowing.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Delivery:
 - 1. Deliver seed and fertilizer in supplier's original unopened package.
 - 2. Deliver sod on pallets.
- B. Store seed and fertilizer in cool, dry area protected from exposure to elements, ground moisture or spoilage.
- C. Handling:
 - 1. Handle seed and fertilizer materials to prevent contamination or spillage.
 - 2. Protect sod from dehydration, contamination and heating.
 - 3. Keep stored sod moist and shaded or covered with moistened burlap.
 - 4. Do not pile sod over 2 ft. deep.
 - 5. Do not tear, stretch or drop sod.

1.05 SITE CONDITIONS

- A. Perform seeding only when preceding related work has been completed.
- B. Do not perform seeding after a rain or when wind velocity exceeds 15 mph.
- C. Restrict foot and vehicular traffic from lawn areas after planting to end of establishment period.

1.06 SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturer's published literature describing products.
 - 2. Submit design mixture of seed and sod.

PART 2 - PRODUCTS

2.01 GRASS SEED MIX

- A. Percentages by weight, approximate:
 - 1. 80% Fine Blade Fescue (chewings fescue, creeping red fescue and hard fescue).
 - 2. 10% Kentucky Bluegrass.
 - 3. 10% Perennial Rye.
- B. Germination:
 - 1. 80% minimum.

2.02 SEED-STARTER STRAW MAT / BLANKET

- A. Description:
 - 1. Basis of Specification: "Guardian", Seed-Starter Mat.
 - 2. 100% weed-free wheat straw.
 - 3. To keep seed in place, shield seeds from pecking birds and hold moisture for seed germination.
 - 4. To not clump, wash or blow away.
 - 5. Mat/Blanket and all fasteners shall completely biodegrade and disappear once lawn is established, without physical removal.
- B. Materials:
 - 1. 3.33 feet wide x 54 feet long roll of seed protection mulch mat/blanket.
 - 2. Biodegradable "BioSTAKES", 4 inches in length, 36 per roll.

2.03 FERTILIZER

- A. Commercial Mixture 8-16-16 or as recommended by State Agricultural Extension Service.
- B. Note that this fertilizer mix has a 1-2-2 or low nitrogen N-P-K ratio, which shall be maintained.

2.04 ACCESSORIES

- A. Mulch:
 - 1. Straw, weed free, as specified in Indiana Highway Specifications 913.05.
 - 2. Manufactured Products:
 - a. Conwed Fibers; "Hydro Mulch".
 - b. Sylva Corporation, Inc.; "Sylva-Fiber".
- B. Stakes:
 - 1. Softwood, 3/4" x 8", for sodded slopes as required.
- C. Erosion Control Blanket:

1. Basis of Specification:
 - a. "American Excelsior Company", AEC Premier Straw Double Net.
 - b. "Forestry Suppliers, Inc.", Jute Mesh Erosion Control Mat.
2. Acceptable alternate products may be submitted by the Contractor for approval by the Architect.
3. Shall contain agricultural straw fibers, free of weeds, for the purpose of erosion control, revegetation and lawn establishment atop newly seeded areas.
4. Blanket and all fasteners shall completely biodegrade and disappear once lawn is established, without physical removal.
5. May use Seed-Starter Straw Mat / Blanket in lieu of the erosion control blanket.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verify that preceding work affecting ground surface is completed.
- B. Seed:
 1. Immediately before seeding is to occur, the entire surface shall be scarified as required and raked until the surface is smooth, friable and a uniformly fine texture.
 2. Till soil thoroughly to minimum depth of 4".
 3. Apply fertilizer to soil at rate of 12 pounds per 1,000 square feet immediately prior to seeding.
 4. Rake or lightly till fertilizer into soil.
- C. Watering:
 1. When topsoil is exceedingly dry, moisten to depth of 4", 48 to 72 hours prior to start of seeding.
 2. Perform watering to prevent run off.

3.02 SEEDING

- A. Shall only be done within the seasons as follows, unless allowed by the Architect and Owner:
 1. March 1 to May 15.
 2. September 1 to October 15.
- B. Before the seed is to be sown, all soft spots and inequalities in grade shall be corrected.
- C. Prior to seeding, mix commercial fertilizer into the seedbed at a rate of 12 pounds per 1,000 square feet.
- D. Seed shall be spread uniformly over entire area in 2 operations at rate of 5 pounds per 1,000 square feet each, for a total of 10 pounds per 1,000 square feet.
- E. Apply second seeding at right angles over the first.
- F. Seeding operation may be by mechanical spreader, broadcast method, drill equipment or hydroseed.
- G. Lightly cover seed by hand raking lawn areas to depth of 1/4".
- H. Smooth and firm all seeded areas with 200 pound roller and water with a fine spray.
- I. Install mulch over all seeded areas at a rate of 1,500 pounds per acre and crimp in place for anchorage. It may be applied via hydraulic mulching equipment or may be added to a water slurry in a hydraulic seeder and combined into a single operation. Straw applied at a rate of two bales per 1,000 square feet may serve as an alternative to the aforementioned mechanical mulching process at contractor's option.

- J. Contractor shall establish a smooth, uniform turf and surface composed of the specified grasses.
- K. Immediately following seeding and mulching, an approved erosion control blanket shall be placed over all areas having a slope of 5:1 or greater. The erosion control blanket shall be staked or stapled into place as per the manufacturer's recommendations. May use Seed-Starter Straw Mat / Blanket in lieu of the erosion control blanket.

3.03 SEED-STARTER STRAW MAT / BLANKET

- A. Prepare the area to be protected by raking the soil to a depth of 1 – 2 inches and removing large dirt clods, sticks and other obstructions.
- B. Apply seed and fertilizer, as specified for seed, and lightly rake into the soil.
- C. Roll out seed-starter mat/blanket over the prepared area making sure to remove any folds or wrinkles in the material. Do not install mat over existing vegetation. If necessary, the mat may be cut to size with sharp scissors or shears.
- D. Fasten material to the soil by installing three biodegradable plastic "BioSTAKes" across the leading edge of the mat, per manufacturer's instructions, by driving them into the ground with a rubber mallet.
- E. Continue installation by the mat with "BioSTAKes" per manufacturer's instructions, being sure to smooth out any wrinkles or folds. If the full roll is not used, secure the terminating end of the mat with three "BioSTAKes", as done on the leading edge.
- F. For large areas requiring more than one mat, seam mats together by overlapping edges 2 – 3 inches and staking per manufacturer's instructions.
- G. For very steep slopes and ditches, bury leading edge (edge of mat at top of slope) in a 6 inch by 6 inch trench to prevent runoff water from getting under mat, per manufacturer's instructions.
- H. Seed-starter mat should be used on all slopes 5:1 or greater to prevent seed from washing out.
- I. Immediately following installation, gently water entire area, thoroughly wetting both the mat and underlying soil. Keep soil moist for the first 30 to 60 days, or until uniform grass establishment is achieved.
- J. Leave mat and biodegradable plastic "BioSTAKes" in place. They will degrade naturally as grass becomes established and typically can be mowed over within 30 to 45 days.

3.04 LAWN ESTABLISHMENT

- A. Provide daily maintenance until lawn is well established.
- B. Provide necessary lawn care including fertilizing, weed eradication, watering, mowing, removal of excess clippings and replacement of unsuitable sod.
- C. Watering:
 - 1. Keep soil moist during seed germination period.
 - 2. Keep sod moist during first week after planting.
 - 3. Supplement rainfall to produce total of 2 inches per day after germination of seed and after first week for sod.
 - 4. Water planting when soil moisture is below optimum level for best plant growth.

- D. Establish period for lawns:
 - 1. Seeded Lawns:
 - a. Extend until uniform stand of grass shows over entire area.
 - 2. Sodded Lawns:
 - a. Until they have been mowed two times.
 - b. Each mowing shall be when height of grass reaches 3" high; cut back to 2-1/2".
 - c. Repair erosion damage after second mowing.

3.05 CLEAN-UP

- A. Remove trash and excess materials from the project site.
- B. Maintain paved areas in clean conditions.
- C. Remove barriers and signs from project site at termination of establishment period.

SUBMITTAL CHECK LIST

- 1. Product Data.

END OF SECTION 02930

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, material, equipment, special tools, supervision and services required to deliver and properly place and complete all cast-in-place concrete work, both plain and reinforced, indicated, noted and detailed on the drawings and specified herein, including (but not limited to) reinforcing steel, anchor bolts, forms, and form removal.

- B. 15 mil Vapor Barrier Systems throughout the project.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 02200 – Earthwork
- Section 02750 – Concrete Paving and Curbs
- Section 03350 – Concrete Finishing

1.03 QUALITY ASSURANCE

- A. Comply with the following standards:
 - 1. ACI Standards (latest editions) for construction procedures. Including but not limited to:
 - a. Specifications for Structural Concrete for Buildings (ACI-301-05).
 - b. Recommended Practice for Hot Weather Concreting (ACI-305).
 - c. Recommended Practice for Cold Weather Concreting (ACI-306).
 - d. Building Code Requirements for Reinforced Concrete (ACI-318-02).
 - e. Guide To Evaluation of Strength Test Results Of Concrete (ACI-214).
 - f. ACI 302.2: Guide for Concrete Slabs that Receive Moisture-sensitive Flooring Materials.
 - 2. ASTM Standards (latest editions) for material specifications.

- B. Testing:
 - 1. See Section 01400 - Quality Control and others as required herein.
 - 2. Pay costs of geotechnical engineer and testing laboratory approved by the Architect/Engineer, tests, inspections and necessary re-testing and re-inspection.
 - 3. Perform following tests, by certified concrete field technician.
 - a. Selection and securing of samples ASTM C172
 - b. Air content*.....ASTM C231 or ASTM C173
 - c. Slump test*.....ASTM C143
 - d. Cylinders - Five - 6" x 12"ASTM C31
 - e. Cylinder Test*.....ASTM C39*Results to be reported by laboratory on test reports
 - 4. Concrete Cylinders:
 - a. Taken for each 50 cubic yards or each day's pour if less than 50 yards.
 - b. Remain undisturbed in a secure location on the site for 24 hours after which they shall be removed to the testing lab by laboratory personnel.
 - c. Two of the cylinders shall be tested at 7 days and two at 28 days for acceptance.
 - d. One cylinder shall be kept in reserve for 56-day test if needed.
 - e. Testing reports shall be made directly by laboratory as follows:
 - One copy to Architect
 - One copy to Contractor
 - One copy to Ready Mix Producer
 - f. Failure of the concrete to meet the specification requirement's may result in its complete removal and replacement at the Contractor's expense.
 - g. Cost of re-test, if any, will be at the Contractor's expense.

- C. Test Failure:
1. In the event results do not meet the specification requirements, one or more of the following will be required at no cost to the Owner:
 - a. Windsor Probe test conforming to ASTM C803.
 - b. Core-boring test conforming to ASTM C42.
 - c. Load test in accordance with Chapter 20, ACI 318-05.
 2. In event Windsor Probe, core-boring or load test indicates concrete does not conform to specifications, contractor shall take such measurements as Architect prescribes or remove defective work as directed by Architect.
- D. Allowable Tolerances:
1. The surface plane tolerance for cast slabs shall be such that depressions between high spots are not greater than 1/8" under a 10 foot straight-edge.
 2. Slabs on grade overall floor flatness and levelness minimums: $F_F = 35$ and $F_L = 25$.
 3. Minimum local values: $F_F = 25$ and $F_L = 15$.
 4. Concrete floor tolerances shall be tested within 72 hours after floor installation. Testing procedures shall comply with ASTM E1155 "Standard Test Method For Determining F_F Floor Flatness and F_L Floor Levelness Numbers". An Independent Testing Laboratory shall be retained by the Contractor to provide floor tolerance testing.
- E. Footings and Slabs On Grade:
1. All footing excavations shall be inspected by the geotechnical engineer and testing laboratory before concrete is placed. The adequacy of the soil shall be determined.
 2. Footings and slabs on grade shall bear on firm natural soil, or on properly compacted engineered fill over firm natural soil, as recommended by the geotechnical engineer.
 3. Engineered fill and backfill under all footings and slabs on grade shall be placed and compacted as recommended by the geotechnical engineer.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Store materials to prevent contamination, deterioration, and weather damage.
- B. Deliver ready-mixed concrete to destination in conformance with ASTM C94.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Cold Weather:
 1. Comply with ACI 306.
 2. Temperature of concrete when placed shall not be less than 50°F.
 3. Maximum concrete temperature 90°F, minimum 50°F per ASTM C94, for duration of curing period.
 4. Concrete shall be placed within 90 minutes of batch time.
- B. Hot Weather:
 1. Comply with ACI 305.
 2. Temperature of concrete when placed shall not be greater than 90°F.
 3. Maximum concrete temperature 90°F, for duration of curing period.
 4. Concrete shall be placed within 90 minutes of batch time. Shorter time limits may apply when air temperature is in excess of 90°F.
 5. Protect from rapid evaporation by spraying or sheeting.
- C. The Contractor shall consider the timing required for placement of concrete for the entire project. He shall include in his bid all work and costs associated with the proper protection, procedures and materials required for the weather and environmental conditions for the time of year the work is to

occur. No additional costs will be borne by the Owner, Architect or their consultants for failure by the Contractor to include these costs in the bid or make reasonable assumptions as to the requirements needed or limitations that may be incurred.

1.06 SUBMITTALS

- A. Concrete Mix Designs:
 - 1. A separate mix design for each class and type of concrete is required.
 - a. Include literature for admixtures.
 - b. Include applicable compliance with referenced ASTM number.
- B. Reinforcing Steel Shop Drawings:
 - 1. Indicate all reinforcing steel sizes, locations, supports, details, lengths laps and bends.
 - 2. Indicate all reinforcing strengths and quantities.
- C. Vapor Barrier Product Data:
 - 1. Submit manufacturer's published literature describing products and system.
 - 2. Submit manufacturer's installation procedures and MSDS sheets.
- D. Curing and Sealing Materials Product Data:
 - 1. Submit manufacturer's published literature describing products.
 - 2. Submit manufacturer's installation procedures and MSDS sheets.

PART 2 - PRODUCTS

2.01 MIX DESIGNS

- A. Design mix with appropriate adjustments for air content and aggregate proportions.
- B. Compressive Strength (minimum) reached by 28 days:
 - 1. 4,000 psi: All concrete for general use, interior and exterior, unless indicated otherwise.
 - 2. 3,500 psi: Curbing.
- C. Air Entrainment:
 - 1. For exterior concrete exposed to weather: Controlled between 4.5% (+/- 1%) by volume.
 - 2. For interior slabs and concrete: no air added.
 - 3. Comply with ASTM C260.
- D. Slump:
 - 1. Footings: 3 inches +/- 1 inch.
 - 2. Foundation walls: 4 inches +/- 1 inch.
 - 3. Interior slabs on grade and slabs over metal decking: 4 inches +/- 1 inch.
 - 4. Exterior slabs, pads, walks, steps and stoops: 4 inches +/- 1 inch.
 - 5. Curbs: 1 inches +/- .5 inch.
 - 6. When water reducing admixtures are used: 7.0 inches maximum.
- E. Water / Cement Ratio:
 - 1. Maximum water to cement ratio for all interior slabs (on grade or over metal decking) to be 0.50.
 - 2. Regardless of any contrary notes on Drawings, in no case shall the water to cement ratio exceed this amount for slabs scheduled to receive floor finishes. Provide admixtures as required for weather conditions at time of pour.

3. If water to cement ratio exceeds this amount in quality control test, that area of slab must be removed at contractor's expense, the mix design corrected as required, and a new slab installed which complies with the proper water to cement ratio. All admixtures required are to be included in the corrected mix design submittal.
4. Minimum cement content: 564 lb. per cu. yd.

2.02 CONCRETE MATERIALS

- A. Portland Cement:
 1. ASTM C150-05, Type 1.
 2. One brand shall be used throughout the work.
- B. Air Entraining Cement:
 1. ASTM C150, Type IA or IIIA.
- C. Aggregates:
 1. ASTM C33:
 2. Coarse Aggregates:
 - a. Clean, tough, durable fragments of crushed stone, uncrushed gravel or dredged river gravel free from dirt or objectionable matter.
 - b. Size: Maximum 1-1/2" at footings; 1" in slabs.
 3. Fine aggregate: Natural sand; clean, sound, hard, durable particles; gradation size No. 1.
- D. Water:
 1. Clean, potable and free from injurious amounts of oil, acids, alkalies, organic matter or deleterious substances.

2.03 ADMIXTURES

- A. Air Entraining Agent:
 1. ASTM C260.
 2. Neutralized vinsol resin solution.
- B. Water Reducing Agent:
 1. ASTM C494.
 2. Types as required to provide controlled setting and/or controlled rate of hardening without increase in water/cement ratio or loss in strength.
- C. Fly Ash/Pozzolans:
 1. ASTM C618.
 2. Class F or C.
 3. Content shall not exceed 20% by weight of the total cementitious content of the mix.
 4. If used in conjunction with Ground Granulated Blast Furnace Slag, the total content of Fly Ash and Ground Granulated Blast Furnace Slag shall not exceed 50% by weight of the total cementitious content of the mix.
- D. Ground Granulated Blast Furnace Slag:
 1. ASTM C989.
 2. Content shall not exceed 30-40% by weight of the total cementitious content of the mix.
 3. If used in conjunction with Fly Ash, the total content of Fly Ash and Ground Granulated Blast Furnace Slag shall not exceed 50% by weight of the total cementitious content of the mix.

- E. Chemical Accelerators and Retarders:
 - 1. ASTM C494.
 - 2. Permitted only upon approval of Architect/Engineer.
- F. Prohibited Admixtures:
 - 1. Calcium chloride, thiocyanates or admixtures containing more than 0.05% chloride ions are NOT permitted.

2.04 MIXING

- A. Measure and mix materials for ready mixed concrete in conformance with ASTM C94.
- B. Take into account free moisture in the aggregate weight.

2.05 CURING MATERIALS

- A. Provide one of the following acceptable products:
 - 1. "BASF/Sonneborn", Kure-N-Seal WB.
 - 2. "Foxfire International", Foxfire P-1007 Sealer.
 - 3. "Master Builders", Masterseal.
 - 4. "W.R. Grace", Clear Seal.
 - 5. "W.R. Meadows/Sealtight", VOCOMP-20.
 - 6. "The Euclid Chemical Company", Super Diamond Clear VOX.
- B. Liquid Membrane: AASHTO M-148 and ASTM C309, Type 1, class A and B.
- C. Waterborne acrylic polymer in a co-solvent emulsion, transparent, quick drying, non-yellowing.
- D. Compatible with flooring adhesives.

2.06 METAL REINFORCEMENT

- A. Bars: ASTM A 615 Grade 60, Type "S", deformed.
- B. Deformation: ASTM A305.
- C. Stirrups and Column Ties: ASTM A 615 Grade 60.
- D. All Other Reinforcement: ASTM A 615 Grade 60, with supplementary requirements (S1).
- E. Welded Wire Reinforcement (WWR), Welded Wire Fabric (WWF), Welded Wire Mesh (WWM):
 - 1. ASTM A 185.
 - 2. 6 x 6 W1.4 x W1.4, or as otherwise indicated.
 - 3. All splices shall be Class B tension lap splice.
- F. Metal Accessories:
 - 1. Including spacers, chairs, ties and other devices necessary for properly assembling, placing, spacing and supporting all reinforcement in place shall be provided.
 - 2. Ties shall be of such type as to leave no metal closer than 3/4" from concrete surface.

2.07 VAPOR BARRIER

- A. Provide one of the following acceptable products:
 - a. "Stego Industries", Stego Wrap.
 - b. "Reef Industries", Vapor Guard.
 - c. "Viper", VaporCheck II.
 - d. "W.R. Meadows", Perminator.
- B. 15 mil polyethylene or polyolefin film slab underlay system.
- C. System shall be comprised of manufacturer's tested assembly of vapor barrier film, seaming tape and penetration sealer tape, sealant or mastic.
- D. ASTM E1745 Class A requirements for water vapor permeance, tensile strength and puncture resistance, except that water vapor permeance shall not exceed .01 perms (as per the definition of a vapor barrier in lieu of a vapor retarder) as tested after mandatory conditioning.

2.08 EXPANSION JOINT FILLER

- A. Provide one of the following acceptable products:
 - 1. "BASF/Sonneborn", Expansion-Joint Filler.
 - 2. "W.R. Meadows/Sealtight", Fibre Expansion Joint.
- B. Pre-molded joint filler strips of resilient, flexible, closed cell, compressible, re-expanding, non-extruding material backing for sealants.

2.09 NON-SHRINK GROUT

- A. Provide one of the following acceptable products:
 - 1. "Euclid Chemical Co.", NS Grout.
 - 2. "BASF", Masterflow 713.
- B. Pre-mixed, factory-packaged, non-staining, non-shrink, non-metallic, non-gassing mortar grouting compound.
- C. ASTM C827, C191, C109, and C1107.
- D. Minimum compressive strength: 5,000 psi
- E. Provide test data that grout when placed at a fluid consistency shall achieve 95% bearing under a 4' x 4' base plate.

2.10 BONDING AND REPAIR MATERIALS

- A. Bonding Compounds:
 - 1. Polyvinyl acetate type.
 - 2. Provide one of the following acceptable products - Rewettable:
(Use only in areas not subject to moisture):
 - a. "Euclid Chemical Co.", Euco Weld.
 - b. "Larsen Co.", Weldcrete.
 - 3. Provide one of the following acceptable products - Non-rewettable polymer modified compound:
 - a. "Euclid Chemical Co.", Euco-Bond.
- B. Epoxy Adhesive:
 - 1. Two component, 100% solids, 100% reactive compound.
 - 2. Suitable for use on dry or damp surfaces.

3. Provide one of the following acceptable products:
 - a. "Euclid Chemical Co.", Euco Epoxy No. 452MV.
 - b. "Euclid Chemical Co.", Euco Epoxy No. 620.
 - c. "Silka Chemical Corp.", Sikadure Hi-Mod.

2.11 FORM WORK

- A. Provide formwork to conform to shape, lines and dimensions of members indicated on Drawings.
- B. Construct formwork sufficiently tight to prevent leakage.
- C. Construct formwork for exposed smooth surfaces of plywood or other similar smooth material.
- D. Bevel exposed concrete corners 3/4 inch unless otherwise indicated on drawings.
- E. Form Coatings:
 1. Approved commercial formulation of proven performance that will not bond with concrete surfaces.
 2. Shall not impair subsequent treatment and curing of, or otherwise adversely affect, concrete surfaces.
 3. Non-staining.
 4. Apply before reinforcing steel is placed.
- F. Tolerances:
 1. ACI 347.

2.12 DRAINAGE FILL / GRANULAR FILL BELOW SLABS-ON-GRADE

- A. See Section 02200 – Earthwork.

2.13 PRECAST PIPE BOLLARD CAP

- A. Symmetrically domed profile utilizing minimum 5000 psi fiber reinforced cementitious material.
- B. Approved product: "TopGard" by TopGard, LLC, www.topgardcap.com (317) 525-0700

PART 3 - EXECUTION

3.01 PREPARATION

- A. Prior to placement of any permanent concrete, footings, slabs or other construction, remove all existing surficial fill, topsoil, organic material, wet soil, loose soil, undesirable soils, abandoned concrete and other materials to the extent indicated by the geotechnical engineer.
- B. Prior to placing concrete, notify all trades to be certain that all sleeves, conduit, chases, etc. are installed and properly located. . Coordinate all openings and chases required in the concrete work and provide all items to be cast into the concrete pour.
- C. Ensure slab subgrade is well drained, of adequate, uniform load bearing nature, and not muddy, soft or frozen.
- D. Dampen subgrade ahead of concreting.
- E. Test Below-slab pipes prior to casting concrete.
- F. Footing excavations shall be drained and firm at time of concrete placement.

- G. Vapor Barrier:
 - 1. Shall be properly installed and ready to receive concrete.
 - 2. Damp proof slab on grade with film underlay between fill and concrete.
- H. Verify reinforcement and anchors, expansion joint material and embedded items are secured in position. Install anchor rods, dovetail slots and other embedded items as required for support of other work that is attached to or supported by cast-in-place concrete.
- I. Joints in Work:
 - 1. Slabs and footings shall have no horizontal joints.
 - 2. Any stop in concrete work shall be made with keyed vertical bulkheads.
 - 3. All reinforcing shall continue through the joint.
- J. The Architect or his representative shall be given 24 hours notice to inspect placement of reinforcing steel before concrete is placed.
- K. Coordination With Floor Finishes:
 - 1. Contractor is responsible for determining maximum floor moisture levels and ph levels acceptable to floor finish manufacturers and installers.
 - 2. Schedule concrete floor slab pours to allow adequate time for moisture to evaporate prior to installing finish flooring.
 - 3. Provide concrete with a maximum water to cement ratio of 0.50.
 - 4. Allow minimum 3 months curing time before installing floor finish materials.
 - 5. Do not densify surfaces of slabs to receive moisture sensitive floor finishes to the point that the slab cannot dry to the surface.

3.02 VAPOR BARRIER

- A. Vapor Barrier:
 - 1. Install the entire system in accordance with ASTM E1643-Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
 - 2. Unroll vapor barrier film over entire area of aggregate or compacted earth base as indicated.
 - 3. Smooth all surfaces and keep clean and free of debris, contamination, tears or damage.
 - 4. Overlap all seams, ends and edges a minimum of 6" in direction of pour.
 - 5. Seal all seams using manufacturer's sealing tape, sealant or mastic.
 - 6. Seal all penetrations through film using manufacturer's sealing tape, sealant or mastic, or a combination as required to fully seal around all penetrating items.
 - 7. Correct any damages or tears in film materials and seam systems to protect integrity of system.
 - 8. Provide temporary overlayers as required to protect vapor barrier during slab installation.

3.03 REINFORCEMENT

- A. Provide bar supports and spacers in accordance with ACI Detailing Manual.
 - 1. All bar supports in areas where concrete will be exposed shall have plastic feet.
 - 2. Precast concrete blocks, 3"x3"x3", 3000 psi, shall be used to support reinforcing off the ground.
 - 3. At all other locations, chairs or standees shall be used.
- B. Detailing, fabrication and placing of reinforcing shall conform to applicable provisions of ACI 315 and ACI 318.
- C. Spread bars around small openings and sleeves in slabs and walls where possible and where bar spacing will not exceed 1-1/2 times the normal bar spacing.

- D. Discontinue bars at large openings where necessary and provide an area of reinforcement equal to the interrupted reinforcement distributing 1/2 of this reinforcement each side of the opening (Class B tension lap splice).
- E. Holes larger than 12 inches in any direction shall have (1) #5 x 5'-0" long diagonal bar in both faces at each corner, whether indicated, detailed or not.
- F. Pier reinforcement shall be doweled to the footing.
Provide dowels equal in size, number and grade to the pier reinforcement, unless otherwise indicated.
Dowels shall be hooked 90 degrees at the bottom level of footing reinforcement.
Dowels shall be lapped with the pier reinforcement.
- G. Pier reinforcement shall be the same size, number and grade as the column/pilaster reinforcing, unless otherwise indicated.
- H. Reinforcing bars and welded wire fabric or mesh shall be placed and secured prior to pouring concrete.
- I. Minimum concrete protection for steel reinforcement:
 - 1. 3/4" for elevated slabs and walls not exposed to earth or weather.
 - 2. 1-1/2" for walls exposed to weather.
 - 3. 3" for footings and other concrete cast against earth.
 - 4. Comply with ACI 318 and 301 requirements for minimum concrete cover for reinforcement.

3.04 CONVEYING AND DEPOSITING

- A. Concrete for footings shall be placed the same day excavations are opened.
If this is not possible, steps shall be taken to properly and adequately protect the excavation and maintain its integrity and levels of acceptability.
- B. Convey concrete from mixer to form as rapidly as practicable, by methods which will prevent segregation or loss of materials.
- C. Vertical drops: maximum three feet free fall.
- D. Place concrete as nearly as possible to its final position at a rate so it remains plastic and flows readily into position. Proceed with placing as a continuous operation until unit of construction is complete. Use vertical construction joints to avoid horizontal joints between concrete placements.
- E. Do not use retempered concrete or concrete partially hardened or contaminated with foreign material.
- F. Ensure forms and conveyance equipment are clean and free of ice, water, debris and hardened concrete.
- G. All vertical concrete surfaces shall be formed, including all footings.
- H. Provide shear keys in the top of all wall and column footings at concrete walls.
- I. Minimum depth for all footings for exterior walls to be 24" below finish grade.
- J. No water may be added to any concrete.

3.05 CURING

- A. Formwork shall remain in place five (5) days before being removed. Remove all formwork in such a manner and at such time as to not damage concrete surfaces and to ensure complete safety to the structure.
- B. Perform curing of concrete of slabs and other horizontal surfaces by moist curing or by use of curing compounds.
- C. Moist Curing:
Moist curing shall be performed by application of polyethylene sheeting per ASTM C171 or continuous wetting of burlap or other type of absorptive cover or mat. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers. Cure for seven days.
- D. Curing Compounds:
 - 1. Apply curing compound immediately following completion of finishing after water sheen has disappeared.
 - 2. Spray or brush uniformly in a single coat immediately after final finishing operation, at rate recommended by manufacturer.
 - 3. Do not use material which discolors concrete or inhibits adherence of other materials.
- E. Meet requirements of hot and cold weather concreting.
- F. For slabs to receive moisture sensitive floor coverings, cure in accordance with recommendations of ACI 302.2.
- G. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.
- H. Do NOT use membrane curing compounds on surfaces which are to receive coatings applied directly to concrete surfaces (liquid floor hardeners, waterproofing, dampproofing, membrane roofing, flooring, concrete coatings, painting, staining, etc.) unless specifically permitted by the Architect, and written documentation is provided by the coating manufacturer that such compound will not have an adverse affect on adhesion, longevity, durability, performance, or any other issue of the product.

3.06 COLD WEATHER REQUIREMENTS

- A. Temperature of concrete when placed shall be not less than 50° F.
- B. Temperature of concrete shall be maintained above 50° F and below 90° F for duration of curing period
- C. Procedures shall be in accordance with ACI 306. Concrete shall be placed within 90 minutes of batch time.

3.07 HOT WEATHER REQUIREMENTS

- A. Temperature of concrete when placed shall be less than 90° F.
- B. Concrete shall be placed within 90 minutes of batch time. Shorter time limits may apply when air temperature is in excess of 90° F.
- C. Procedures shall be in accordance with ACI 305.

3.08 CONSOLIDATION

- A. Consolidate concrete with high-frequency vibrators.

- B. Insert vibrators into each 18" lift at intervals not to exceed 12". Insert for sufficient duration to produce complete consolidation without over-vibrating to cause separation.
- C. Remove excess free water collecting on the surface during the vibration before finishing.

3.09 JOINTS

- A. Locate and construct all joints as shown on the Drawings, or if not shown, as specified herein, or if not specified, as directed by Architect.
- B. Construction Joints.
 - 1. May be substituted for control or contraction joints in slabs on grade at the indicated locations of such joints or as approved by the Architect.
 - 2. Provide keyed joints between all cast sections of slabs on grade.
- C. Control Joints:
 - 1. Depth: 1/3 thickness of slab or 1" minimum depth, whichever is greater.
 - 2. Width: Maximum 3/16".
 - 3. Spacing:
 - a. Slabs:
 - 1) 4" slab = 12'-0" o.c. maximum.
 - 2) 5" slab = 13'-0" o.c. maximum.
 - 3) 6" slab = 14'-0" o.c. maximum.
 - 4) 7-1/2" slab = 16'-0" o.c. maximum.
 - 5) At greater frequency and other locations as indicated on Drawings.
 - b. Walks:
 - 1) 4'-0" o.c. or the width of the walk whichever is less.
 - 2) At greater frequency and other locations and patterns as indicated on Drawings.
 - c. Walls:
 - 1) At 20'-0" o.c. each way, maximum.
 - 2) At greater frequency and other locations as indicated on Drawings.
 - 4. Wet cut joints immediately after concrete set and able to support machine and personnel. Maximum 24 hours after placing.
 - 5. Saw cut joints are not acceptable unless authorized in writing by Architect.
 - 6. For control joints scheduled to receive joint fillers, comply with joint filler manufacturer's recommendations for depth and preparation of joint.
- D. Expansion Joints: Install 1/2" expansion joint filler at concrete pavement joints; hold down below surface or cut the required depth for sealant.
- E. Carry reinforcement across joints in slabs except at expansion joints.

3.10 FINISHING: CONCRETE FINISH SCHEDULE

- A. Interior:
 - 1. Hard trowel smooth finish.
- B. Exterior:
 - 1. Stoops: Hard trowel smooth finish.
 - 2. Walks: Broom finish. (Hard trowel smooth at expansion and control joints).
 - 3. Steps: Vertical surfaces rubbed; horizontal surfaces broom finish.
- C. Broom finish by drawing broom across surface, transversely after hard troweling (not just floating).

3.11 BOLLARD CAP

A. After filling pipe bollard with concrete, install precast bollard cap while concrete is still wet.

3.12 PROTECTION

A. Protect fresh concrete from heavy rains, extreme air temperatures, injurious sun, mechanical injury and other deleterious elements.

B. If scaling occurs from failure to take protective precautions, repair or replace damaged concrete.

3.13 PATCHING

A. Do not patch any surface until examination is made by the Architect and permission is given.

SUBMITTAL CHECK LIST

1. Concrete Mix Designs.
2. Reinforcement Steel Shop Drawings.
3. Vapor Barrier Product Data.
4. Curing and Sealing Materials Data.

END OF SECTION 03300

SECTION 03451 - PLANT PRECAST CONCRETE WALL PANELS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Design, fabricate, deliver and install concrete wall construction including the structural design of the wall panels for erection, wind, seismic and lateral bracing stresses.
 - 1. Design the wall panels to resist the stresses caused by erection of the wall panels, and determine the means and methods to be used for erection and bracing until permanent bracing is in place.
 - 2. Erect the panels in a manner that will be both safe for personnel and property, and brace and otherwise protect the panels against wind, seismic, and other forces that may occur during construction and until connections to the permanent structural system are completed.
 - 3. Installation of temporary bracing and shoring is included as work of this section.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 03300 - Cast-in-Place Concrete
- Section 08111 - Standard Steel Doors and Frames
- Section 07901 - Joint Sealants
- Section 09900 - Painting

1.03 REFERENCES

- A. The latest edition of the Indiana Building Code.
- B. American Welding Society (AWS):
 - 1. Structural Welding Code - ANSI/AWS D1.4.
- C. American Society for Testing and Materials (ASTM):
 - 1. A123 - Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel.
 - 2. A185 - Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
 - 3. A615 - Specification for Deformed and Plain Billet - Steel Bars for Concrete Reinforcement.
 - 4. A706 - Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement.
 - 5. C31 - Method of Making and Curing Concrete Test Specimens in the Field.
 - 6. C33 - Specification for Concrete Aggregates.
 - 7. C39 - Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 8. C94 - Specification for Ready-Mixed Concrete.
 - 9. C143 - Test Method for Slump of Portland Cement Concrete.
 - 10. C150 - Specifications for Portland Cement.
 - 11. C309 - Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- D. American Concrete Institute (ACI), latest Annual Edition:
 - 1. 117 - Standard Specification for Tolerances for Concrete Construction and Materials.
 - 2. 301 - Specifications for Structural Concrete for Buildings.
 - 3. 305 - Hot Weather Concreting.
 - 4. 306 - Cold Weather Concreting.
 - 5. 315 - Manual of Standard Practice and Specifications for Placing Reinforcement.
- E. Concrete Reinforcing Steel Institute (CRSI):
 - 1. Manual of Standard Practice and Specifications for Placing Reinforcement.

1.04 SUBMITTALS

- A. Registered Engineer:
 - 1. Submit name of Registered Professional Engineer retained by the Contractor to design panels.
- B. Quality Control Submittals:
 - 1. Test Reports: When, and as directed by the Contract Documents, submit certified laboratory test reports confirming physical characteristics of material used in the performance of the Work of this Section.
- C. Material Submittals:
 - 1. Concrete mix designs for each mix specified.
 - 2. Manufacturer's literature for bondbreakers.
 - 3. Mix design for structural grout for panel support.
 - 4. Manufacturer's literature for sealants and caulking.
- D. Design Criteria:
 - 1. Wall panels shall be designed in accordance with the PCI Design Handbook, and the American Concrete Institute Building Code Requirements (ACI 318-71) for the load conditions shown on the drawings.
 - 2. Live load deflection: Maximum $L/360$.
 - 3. Wind load per building code.
 - 4. Seismic load per building code.
- E. Prestressed concrete wall panel manufacturer shall be fully responsible for the design of all prestressed units to adequately withstand all external and internal stresses due to all dead, live and temperature loads encountered during manufacturer, handling, erection and installed use.
- F. Allowable Tolerances:
 - 1. Length: $L/360$.
 - 2. Width $1/16$ " per 1'-0" of width under; but no greater than nominal width.
 - 3. Camber: $L/960$.
 - 4. Squareness of ends: $3/16$ "
- G. Insulation: Minimum R-15
- H. Submit fabrication and erection drawings to the Architect for approval showing prestressing strands, steel reinforcement, insulation, location of openings, and all other miscellaneous details. Each wall panel unit shall be identified by a standard mark placed legibly on the unit at the time of manufacture, and located on the erection plan. Drawings to be stamped by registered Engineer licensed to practice in the location where the panels are to be installed. Indicate all architectural patterning and finishes.

1.05 QUALITY ASSURANCE

- A. Regulatory requirements: Comply with applicable codes and regulations of governmental agencies having jurisdiction. Where those requirements conflict with this Specification. Notify Architect for clarification prior to performing work.
- B. Qualifications for Production: Contractor shall show evidence of competence in tilt-up concrete construction. Workers shall be proficient in production and erection operations and shall be under the direct supervision of a competent superintendent/foreman at all times.

- C. Qualifications for Welding:
 - 1. Qualify welding processes and welding operators in accordance with ANSI/AWS D1.4.
 - 2. Provide certification that welders to be employed in the work have satisfactory passed AWS qualification tests within the previous 12 months.

- D. Precast plant shall be a PCI Certified Plant in good standing, A1 Certification for Architectural Products, as certified by the Precast/Prestressed Concrete Institute.

PART 2 - PRODUCTS

2.01 APPROVE PRECAST FABRICATORS:

- A. ATMI – INDY, LLC
6324 W. Stoner Drive
Greenfield, IN 46140
(317) 891-6280
(317) 891-6281 Fax

- B. Coreslab Structures (Indianapolis) Inc.
1030 S. Kitley Avenue
Indianapolis, IN 46203
(317) 353-2118
(317) 357-6012 Fax

- C. deAm-RON Building Systems, LLC
6137 U.S. Highway 60 E
Owensboro, KY 42303
(270) 684-6226

2.02 MANUFACTURED ITEMS:

- A. Lifting hardware, inserts, braces, and related embedded and attached items shall be manufactured specifically for precast

2.03 PANEL MATERIALS

- A. The steel prestressing tendons shall be high tensile strength, uncoated, 7-wire strand conforming to or exceeding ASTM Specification A-416.

- B. Concrete Materials:
 - 1. Cement: Portland cement, conforming to ASTM C1150, Type III.
 - 2. Fine and coarse limestone aggregates shall consist of clean, hard strong, and durable inert materials, free of injurious amount of deleterious substances, conforming to ASTM C33 for normal weight concrete and ASTM C330 for lightweight aggregate concrete.
 - 3. Concrete shall be a laboratory design mix approved by Architect/Engineer.
 - 4. Mixing water shall be free and any acid, alkali, oil or organic material that may interfere with the setting of the cement.
 - 5. Admixtures shall be approved by Architect/Engineer.
 - 6. All concrete shall be produced and delivered in accordance with ASTM C94.

- C. Quality of Concrete
 - 1. Ready-mixed concrete shall conform to ASTM C94.
 - 2. Concrete shall have a minimum compressive strength at 28 days of 5,000 psi, 3,000 psi at detensioning, and tested according to ASTM C39 and C31.
 - 3. Water-cement ration shall be kept to a minimum, and concrete slump shall not exceed by more than one-half (1/2") inch the requirements of the project drawings or as specified.
- D. Sacking materials: Portland cement and water, mixed to a uniform creamy paste.
- E. Dry-pack materials: In accordance with requirements specified in Section 03300 - Cast-in-Place Concrete.
- F. Steel Reinforcement:
 - 1. Reinforcing bars shall be ASTM A615, Grade 60 or to ASTM A706. For bars conforming to ASTM A615, which will be welded, furnish a report of the chemical analysis for each heat of the bars.
 - 2. Structural steel: ASTM A-36.
- G. Miscellaneous Metals:
 - 1. Conform to requirements of Section 05120 - Metal Fabrications.
 - 2. Provide all inserts, dowels, and other items to be cast in panels, including items required for pick-up.
 - 3. Steel which will be exposed in finished panels shall be plastic-tipped or hot-dipped galvanized after fabrication in accordance with ASTM A123.
- H. Supports for Reinforcing Steel and Welded Wire Fabric:
 - 1. Supports may consist of metal, all-plastic, concrete, or fiber-reinforced concrete materials.
 - 2. Metal supports shall be either galvanized after fabrication or plastic tipped.
 - 3. All-plastic supports should be of such design as to adequately support reinforcement, provide minimal surface contact and be of such coloring as to not be visible on any surfaces even in situations of sever exposure or grinding. Minimal surface contact is defined as 4-6 contact points with a surface area not to exceed .10 square inches (64.5 mm²) per contact point. Refer to CRSI Manual of Standard Practice for all-plastic high chair options.
 - 4. Concrete or fiber-reinforced concrete supports may only be used in slab on grade situations or where surface contact is not visible.

2.03 FABRICATION

- A. All wall panel units shall be form-cast on production lines in smooth, rigid forms. Place concrete in continuous operation to prevent cold joints.
- B. Finish:
 - a. Top surface: Smooth Troweled
 - b. Sides: Cast in forms.
 - c. Exterior Face (Bottom): Steel Form
 - d. Exterior finish shall be finished as noted on the drawings.
 - e. All panel edges to be keyway.
- C. Openings shown on the drawings shall be cast in the wall panel units.
- D. All miscellaneous steel items shown on the drawings embedded in wall panels will be furnished by precaster. All loose steel items necessary for the installation of the pre-stressed wall panel units will be furnished by precaster.

- E. All reinforcing shall have 3/4" min. cover at exterior for sandwich panels insulation shall be 4" nominal thick moulded polystyrene foam, 1.5 lbs/CF density and used in accordance with the recommendations of ACI Committee 533.

2.04 SEALANT AND CAULKING MATERIALS

- A. Sealants: In accordance with Section 07900 – Joint Sealers.

PART 3 - EXECUTION

3.01 GENERAL

- A. Inspect bearing surface for true and level line.
- B. Clear, well-drained unloading areas and road access around and in the building (where appropriate) shall be provided and maintained by General Contractor to a degree that all trucks delivering precast concrete products are able to reach their unloading areas under their own power. Erector shall have uninterrupted access to the structure during erection.
- C. Install precast concrete members plumb, level and in alignment within specified limits of erection tolerances. Provide temporary supports and bracing as required to maintain position, stability and alignment as members are being permanently connected.
- D. When setting precast on concrete, provide shims to support precast weight until final grouting.
- E. The wall panels shall be aligned and leveled before grouting the panel bases with a sand and cement grout.
- F. Erection Tolerances: Install precast units without exceeding following tolerance limits:
 - 1. Plan location from building grid datum: total plus or minus 1/2" at any location.
 - 2. Plan location from centerline of steel: total plus or minus 1/2" at any location.
 - 3. Top elevation from nominal top elevation:
 - a. Exposed individual panel: total plus or minus 1/4" at any location.
 - b. Non-exposed individual panel: total plus or minus 1/2" at any location.
 - c. Exposed relative to adjacent panel: 1/4" total variation.
 - d. Non-exposed relative to adjacent panel: 1/2" total variation.
 - 4. Bearing / Support elevation from nominal elevation
 - a. Maximum low 1/2"
 - b. Maximum high 1/4"
 - 5. Maximum plumb variation over height of structure: 1/2" - max. 50' height.
 - 6. Plumb in any 10 ft. of element height: 1/4"
 - 7. Maximum jog in alignment of matching edges: 1/4"
 - 8. Joint width (governs over joint taper): plus or minus 3/8" over the entire length of the joint.
 - 9. Joint taper over length of panel: 1/2"
 - 10. Joint taper over 10 ft length: 3/8"
 - 11. Maximum jog in alignment of matching faces
 - a. Exposed: 1/4"
 - b. Non-exposed: 1/2"
 - 12. Differential bowing, as erected, between adjacent members: 1/4"
 - 13. Opening height between spandrels: plus or minus 1/4"
 - 14. Form finished reveal joints from level: plus or minus 1/8" over width of panel
 - 15. Form finished reveal joints alignment from panel to panel: plus or minus 1/4".
 - 16. Tolerances not listed: comply with ACI Manual for Erection (MNL-127 Edition 2) figure 5.2(e).

3.02 CASTING PANELS

- A. Coordinate installation of inserts and anchorages required to be set into concrete slab prior to casting of panels.
- B. Where reveals are required in panels, assure that forming strips are straight and securely fastened to prevent movement or floating during placing operations and that alignment between adjacent panels is correct.
- C. All openings are to have chamfered edges.
- D. Unless specifically permitted by the Architect, no door frames shall be cast into the panels. They shall be field installed to the finished concrete openings.

3.03 CURING AND PROTECTION

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures, and maintain without drying at a relatively constant temperature for the period of time necessary for hydration of the cement and proper hardening of the concrete in accordance with ACI Standard Practice for Curing Concrete (ACI 308).
- B. Apply liquid membrane curing compound in accordance with manufacturer's recommendations.

3.04 HANDLING AND ERECTION OF PANELS

- A. Design for erection stresses and select lifting system and hardware.
- B. Minimum strength of panels at time of erection shall be in accordance with the lifting design.
- C. Protect elements to prevent staining, warping, or crackling.
- D. Patch or repair defects in panels by grinding and patching compound compatible with curing compound.
- E. Use erection equipment that will prevent damage to existing construction, permanent floor slabs, and panels. Any damage to Work shall be repaired or replaced at the Contractor's expense.
- F. Set panels in the position assigned. Place panels on prepared setting pads as detailed on the project drawings, or proper-capacity shims. Level panels and grout space under panels for full bearing, same day panels are set using non-shrink grout. Panels to be straight, square and level.
- G. Panels shall be braced in position using a bracing system designed to resist wind, seismic, and other loads that may occur during construction and until permanent bracing is in place. Design of bracing shall be the responsibility of the Precaster/Erector.
- H. Concrete panels shall be as old as possible but not less than 14 days old before panel-to-panel connections are made, unless approved by the Architect/Engineer. Perform welding required to attach panels to building frame and to each other, in accordance with ANSI/AWS D1.4.
- I. Protect erected elements.
- J. Visible surfaces of the panels, when in place shall be free from surface defects readily observable from a distance of 40 feet.
- K. After the panels are erected, dismantle panel pickup devices and patch panels as required for a uniform appearance.

- L. After panels are erected, patch holes or other blemishes in casting slab which were caused by the panel casting and erection process in a manner acceptable to the Architect/Engineer.
- M. Cut off lifting devices on the interior. Where rake finish exterior is required all lifting devices shall be removed from the panel faces and weather protected.

3.06 FINISH

- A. Concrete Finish: panels shall be free of voids, cracks, spalls, protrusions, or non-uniform texture. All holes shall be filled with patching material to present a uniform surface from panel to panel.
 - 1. Exposed surfaces of panels shall be finished as indicated on the project drawings.
 - 2. Surfaces to be painted shall be prepared to receive paint finish as specified in Section 09900.
 - 3. All exposed interior surfaces of all panels to be steel trowel finish.

3.07 FIELD QUALITY CONTROL

- A. Testing:
 - 1. Take not less than 4 cylinders for each class of concrete, for each 150 cubic yards or fraction thereof, for each day concrete is cast, or not less that once for each 5,000 square feet of panel area.
 - 2. Of each set of 4 cylinders, two shall be tested at 7 days and two at 28 days.
 - 3. Casting and curing of test cylinders shall be in accordance with ASTM C31.
 - 4. Test cylinders and test reports shall accurately indicate in which panel, by number, the concrete represented by each test cylinder was placed.
 - 5. Copies of test reports shall be distributed to Owner, Architect/Engineer, Building Official, and Contractor. Reports shall indicate location of tests, dates, technician, and other pertinent information.
- B. Deficient Compressive Strength
 - 1. In the event that concrete tests indicate a 7-day or 28-day strength below that which was specified, the Contractor with the agreement of the Architect/Engineer shall have the mix adjusted so that subsequent concrete will comply with the minimum strength requirements. The Owner may require core specimens to be taken and tested, at the Contractors expense. If core tests fall below minimum requirements, as determined by the Architect/Engineer, the concrete in place will be deemed to be defective. This concrete shall be removed and replaced. Any demolition or repair of other materials or systems as a result of repair or replacement of defective concrete shall be at the Precaster's expense.

3.08 CRACKED AND DAMAGED PANELS

- A. Panels damaged during erection, cracks readily visible, permanent bowing occurring from erection, and spalls, shall be repaired or replaced to the satisfaction of the Architect/Engineer.

3.09 INSULATION

- A. All wall panels have a core of insulation where noted on the drawings. The insulation shall be installed at the plant of the panel manufacturer.

3.10 CLEANING

- A. When work of this Section has been completed, remove trash, debris, surplus materials, tools, and equipment from site.
- B. Repair any damage caused to site or work of other trades.

3.11 PROTECTION

- A. During the period of this Work, protect precast concrete finished concrete surfaces from damage by subsequent construction operations.

SUBMITTAL CHECKLIST

1. Engineer Certification.
2. Shop Drawings.

END OF SECTION 03470

SECTION 04100 - MORTAR

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, supervision and services required to provide and complete all mortar for setting of all masonry work on this Project as indicated, noted, detailed and scheduled on the drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 04150 - Masonry Accessories
- Section 04160 - Masonry Reinforcement
- Section 04220 - Concrete Unit Masonry
- Section 04510 - Masonry Protection and Cleaning

1.03 REFERENCES

- A. Publications of the following Institutes, Associates, Societies and Agencies are referred to in this section:
 - 1. American Society for Testing and Materials (ASTM).

1.04 SUBMITTALS

- A. Manufacturer's Literature:
 - 1. Materials description of cement.
 - 2. Manufacturer's test data for mortar mixtures.
- B. Samples:
 - 1. Manufacturer's actual sample bars of entire selection of standard mortar colors.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver mortar materials, except sand, in full, unopened bags.
 - 1. Store packaged materials off the ground and keep covered and protected from weather until used.
- B. Deliver and stockpile sand in vicinity of the approved batch mixing location.
- C. Pre-mixed sand/mortar, silo type batch plants may be used on site.
- D. Use pipe or hose to provide clean fresh water at the batch mixing location.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Masonry Cement:
 - 1. Provide one of the following approved products:
 - a. "Essroc", Brixment.
 - b. "Cemex", Kosmortar.
 - c. "Lafarge", Masonry Cement.
 - 2. Masonry Cement shall comply with the requirements of ASTM C91.
 - 3. Portland Cement, Type 1, shall comply with the requirements of ASTM C150.
- B. Hydrated Lime:
 - 1. To comply with the requirements of ASTM C207.

- C. Aggregates to Setting Mortar:
 - 1. Shall comply with the requirements of ASTM C144.
 - 2. For joints 1/4 inch thick or less, 100% shall pass No. 8 sieve and 95% shall pass No. 16 sieve.
- D. Water:
 - 1. Clean, fresh and potable.
 - 2. Free from injurious amounts of oils, acids, alkalis, organic matter or deleterious substances.

2.02 MIXES

- A. Mortar Mixes:
 - 1. All components to be pre-measured, pre-packaged and pre-mixed by the manufacturer.
 - 2. Ready-mixed mortar, prepared offsite and delivered for storage in tubs, will NOT be acceptable.
- B. Type S Mortar:
 - 1. 1,800 psi minimum, high compressive strength tested in accordance with ASTM C270.
 - 2. For use at all masonry walls.
- C. No chemical admixtures shall be added to the mortar without the express permission of the Architect.
- D. Mortar Color:
 - 1. Standard natural mortar, uncolored.

PART 3 - EXECUTION

3.01 MIXING

- A. Mix mortar mix and water proportions by volume per manufacturer's requirements.
- B. Mix mortar in an approved drum type batch mixer to a uniform color, texture and consistency.
 - 1. Measure ingredients carefully and completely empty drum between batches.
 - 2. Hand mixing will not be permitted.

3.02 CONSISTENCY

- A. Mortar shall be consistent to the satisfaction of the mason and may be re-tempered on the boards by adding small amounts of water and remixing if stiff due to evaporation.
- B. Do not use mortar that has become stiff due to hydration or that has been mixed more than two hours.

SUBMITTAL CHECK LIST

- 1. Manufacturer's Literature.

END OF SECTION 04100

SECTION 04150 - MASONRY ACCESSORIES

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. All labor, materials, equipment, special tools, supervision, and services required to provide and complete all masonry accessories for all masonry work on this Project as indicated, noted, detailed, and scheduled on the Drawings or specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 04100 - Mortar
- Section 04160 - Masonry Reinforcement
- Section 04220 - Concrete Unit Masonry
- Section 04510 - Masonry Protection and Cleaning

1.03 DELIVERY, STORAGE AND HANDLING

- A. Storage: Store steel accessories off of the ground, on blocking, with waterproof cover.

1.04 QUALITY ASSURANCE

- A. All work shall comply with ACI-530 and recommendations of The Masonry Society.
- B. Hot dipped galvanizing after fabrication per ASTM A153 (1.5 oz./ft.).

1.05 SUBMITTALS

- A. Manufacturer's Literature:
 - 1. Manufacturer's data sheets, cut sheets and materials description.
- B. Samples:
 - 1. Provide actual sample of unit as requested by the Architect.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide products, as approved by the Architect, by one of the following acceptable manufacturers:
 - 1. Hohmann & Barnard (H&B).
 - 2. Masonry Technology Inc. (MTI).
 - 3. Advanced Building Products.
 - 4. Sandell Manufacturing.
 - 5. A-A Wire Products Company.
 - 6. Baltimore Birmingham.
 - 7. DUR-O-WALL, Inc.
 - 8. Heckman Building Products, Inc.
 - 9. Masonry Reinforcing Corp. of America.
 - 10. National Wire Products Corp.

2.02 MATERIALS

- A. Weep Holes:
 - 1. Provide one of the following approved products:
 - a. "H&B", #QV-Quadro Vent.
 - b. "MTI", Cavity Vent.
 - c. "Advanced Building Products", Mortar Maze.
 - d. "Sandell Manufacturing", Mortar Net Weep Vents.

- B. Control Joints:
 - 1. Provide one of the following approved products:
 - a. "H&B", RS Series.
 - b. "BoMetals, Inc.", BCJ Series.
 - 2. Preformed elastomeric rubber, with shear keys and flanges.

- C. Beam Anchors:
 - 1. Provide one of the following approved products:
 - a. "H&B", #357.
 - 2. Hot dipped galvanized.

- D. Mortar/Grout Screen:
 - 1. Provide one of the following approved products:
 - a. "H&B", #MGS.
 - 2. 1/4" square microfilament screen.
 - 3. Polypropylene polymer, non-corrosive.

- E. Rebar Positioners:
 - 1. Provide one of the following approved products:
 - a. "H&B", #RB and #RB-Twin.
 - 2. Z-shaped wire bridge.
 - 3. 9 gauge wire.
 - 4. Size for block width and core dimension as required.
 - 5. Hot dipped galvanized.

- F. Masonry Slip Joint:
 - 1. Provide one of the following approved products:
 - a. "H&B", #NS.
 - 2. Placed in masonry coursing below relieving angle.
 - 3. Closed cell neoprene sponge.
 - 4. 3/8" thickness to match mortar joint coursing x width of entire masonry unit.
 - 5. Adhesive backing, one side only.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Weep Holes:
 - 1. Install in strict accordance with the manufacturer's published recommendations.
 - 2. Provide in head joints in first course immediately above all flashing, at spacing as indicated on the drawings. If not indicated, provide at 32" o.c.
 - 3. Keep area above flashing free of mortar droppings.

- B. Control Joints:
 - 1. Install in strict accordance with the manufacturer's published recommendations.
 - 2. Provide control joints at all inside corners and where new masonry abuts existing masonry.
 - 3. Lap horizontal joint reinforcing at all control joints.
 - 4. Locate vertical control joints at 16'-0" o.c. maximum for all masonry.
 - 5. Locate elsewhere where indicated on the Drawings.

- C. Ties and Anchors:
 - 1. Install in strict accordance with the manufacturer's published recommendations.
 - 2. Install ties into projecting eyes of truss or ladder type wall reinforcement, or into retainer area of supportive stud clip or anchor device.
 - 3. Position for proper placement in veneer wall.

- D. Rebar Positioners:
 - 1. Install in strict accordance with the manufacturer's published recommendations.
 - 2. Secure all vertical reinforcing bars in all masonry walls by use of positioners.
 - 3. Position re-bar in center of concrete block core.
 - 4. Rest bends of wire on shell of block to allow wire to span and bridge cell.

- E. Masonry Slip Joint:
 - 1. Install in strict accordance with the manufacturer's published recommendations.
 - 2. Place at horizontal mortar joint coursing located just below the steel relieving angle in both the veneer and the masonry back-up wall.
 - 3. Install with adhesive backing, bottom side only. Top side shall be free to "float" below course above.

SUBMITTAL CHECKLIST

- 1. Manufacturer's Literature.
- 2. Samples.

END OF SECTION 04150

SECTION 04160 - MASONRY REINFORCEMENT

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, supervision and services required to furnish and install all masonry reinforcement indicated, noted and detailed on the Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 04150 - Masonry Accessories
- Section 04220 - Concrete Unit Masonry

1.03 REFERENCES

- A. Publications of the American Society for Testing and Materials, ASTM are referred to in this section.
- B. All work shall comply with ACI 530 and recommendations of The Masonry Society.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Arrange deliveries to provide sufficient quantities of reinforcement to permit continuity of masonry work.
- B. Store reinforcement on blocks or shores to prevent contact with the ground and keep covered to prevent damage from the weather.

1.05 SUBMITTALS

- A. Manufacturer's Literature:
 - 1. Manufacturer's data sheets, cutsheets and materials description.
 - 2. Test data for strength and integrity.
- B. Samples:
 - 1. Provide actual sample of unit as requested by the Architect.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide products, as approved by the Architect, by one of the following acceptable manufacturers:
 - 1. Hohmann & Barnard (H&B).
 - 2. A-A Wire Products Company.
 - 3. Baltimore Birmingham.
 - 4. Wire-Bond
 - 5. Heckman Building Products, Inc.
 - 6. Masonry Reinforcing Corp. of America.
 - 7. National Wire Products Corp.

2.02 MATERIALS

- A. Materials shall conform to the following requirements:
 - 1. American Society for Testing and Materials (ASTM).
 - 2. "Cold-Drawn Steel Wire for Concrete Reinforcement", ASTM Designation A82.
 - 3. Mill galvanized wire in accordance with ASTM A641, Class 3 (0.80 oz./ft.2).
- B. Provide deformed bars of the size indicated on the drawings of the following grades:
 - 1. All reinforcing: ASTM A615, Grade 60.

- C. Provide all required metal accessories, including spacers, chairs, ties and other devices necessary for properly assembling, placing, spacing and supporting all reinforcement in place.

2.03 HORIZONTAL JOINT REINFORCEMENT

- A. Description:
 - 1. Hot dipped galvanized.
 - 2. Prefabricated from cold-drawn steel wire complying with ASTM A82.
 - 3. Welded wire units comprised of two No. 9 gauge deformed continuous longitudinal side rods and a continuous No. 9 gauge plain cross rods at 16" o.c. maximum, spanning between to form a truss design.
 - 4. Factory prefabricated Corners and Tees shall be used at all corners and intersecting walls and shall be of the same design, gauge, profile and finish as the continuous joint reinforcement.
- B. Size:
 - 1. Furnish in standard length sections, not less than 10'-0".
 - 2. Width to be 2 inches less than width of the wall.
- C. Provide one of the following approved products for single-wythe systems:
 - 1. "H&B", #120, Lox-All Truss Mesh.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Clean reinforcement of loose rust, mill scale, earth, ice or other materials which will reduce bond to mortar or grout.
- B. Position reinforcement accurately at the spacing shown. Support and secure vertical bars against displacement. Provide a clear distance between bars of not less than the nominal bar diameter or 1 inch, whichever is greater.
- C. Provide continuous horizontal joint reinforcement in all reinforced masonry walls at 16 inches o.c.
- D. For pilasters, provide a clear distance between vertical bars as shown, but not less than 1-1/2 times the nominal bar diameter or 1-1/2 inches, whichever is greater. Provide lateral ties as shown.
- E. A continuous bond beam with (2) #5 bars shall be provided at the top of all walls, and at all bearing elevations, unless otherwise indicated.
- F. At beams or lintels bearing on masonry walls, fill (2) block cores solid with grout and reinforce each core with one vertical #5 bar full height of wall, unless otherwise indicated.
- G. Place (1) full height vertical #5 bar at all wall corners, ends of walls, sides of openings and wall intersections, unless otherwise indicated. Place (2) vertical #5 bars at sides of openings 10'-0" wide and greater, unless otherwise indicated.

3.02 SPLICES

- A. Splice reinforcing bars where shown. Do not splice at other points unless approved by the Architect/Engineer.
- B. Splices shall be lapped, unless otherwise indicated.

- C. In splicing vertical bars or attaching to dowels, lap ends and place bars in contact and tie with wire.
- D. Splices in vertical reinforcement shall be lapped a minimum of 48 bar diameters, unless noted otherwise.

SUBMITTAL CHECKLIST

- 1. Manufacturer's Literature.
- 2. Samples.

END OF SECTION 04160

SECTION 04220 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, supervision and services required to provide and complete all concrete unit masonry work on this Project as indicated, noted, detailed and scheduled on the drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 04100 - Mortar
- Section 04150 - Masonry Accessories
- Section 04160 - Masonry Reinforcement
- Section 04510 - Masonry Protection and Cleaning

1.03 QUALITY ASSURANCE

- A. Comply with the provisions of the latest editions of the following Codes, Specification and Standards, except as otherwise indicated on the Drawings or specified herein.
 - 1. The Masonry Society, Masonry Designer's Guide.
 - 2. ACI 530 Building Code Requirements for Masonry Structures.
 - 3. ACI 530.1 Specifications for Masonry Structure.
 - 4. NCMA "Specification for the Design and Construction of Load-Bearing Concrete Masonry".
 - 5. "American Standard Building Code Requirements for Masonry, A41.1-1953 (R1970)".
 - 6. American Society for Testing and Materials (ASTM).
- B. Concrete masonry units used throughout the work shall be obtained from one manufacturer.
- C. Reinforced hollow load-bearing CMU shall be Grade N-I moisture controlled units conforming to ASTM C90-85. Minimum Compressive Strength required for units shall be 2,000 psi on the NET AREA of the units and 1,000 psi on the GROSS AREA. Normal weight or light weight units.
- D. Provide special shapes where required, for lintels, bond beams, pilasters, headers and other special conditions.

1.04 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's catalog data, cut sheets, literature, specifications and installation instructions.
 - 2. Test data for unit strength.

PART 2 - PRODUCTS

2.01 CONCRETE MASONRY UNITS (CMU)

- A. Size:
 - 1. Standard-sized units shall be used, unless otherwise noted.
 - 2. Nominal face dimensions of 16 inches long x 8 inches high.
 - 3. Thickness of units shall be as indicated on drawings.
 - 4. See drawings for additional requirements or clarifications for type, face, texture, finish, color, etc.
- B. Properties:
 - 1. Below Grade: Standard/Normal weight units with sand, gravel, crushed stone, aggregate.
 - 2. Above Grade: Light weight units with expanded aggregate.
 - 3. Shall comply with the requirements of ASTM C90.

- C. Reinforced Load-Bearing CMU and CMU Shear Walls:
 - 1. Grade N-1 moisture controlled units.
 - 2. Minimum compressive strength of 2,000 psi on the NET AREA of the units.
Minimum compressive strength of 1,000 psi on the GROSS AREA of the units.
Standard/Normal weight or Light weight units.
 - 3. Shall comply with the requirements of ASTM C90-85.
 - 4. Net compressive strength: $f'_m = 1,500$ p.s.i minimum (Prism or Unit Strength Method).
- D. Color: Standard natural, non-colored concrete masonry unit.

2.02 SPECIAL UNITS

- A. Provide special shapes where required throughout the work for lintels, bond beams, bullnoses, pilasters, headers and other special conditions.
- B. Same material, surface, texture, aggregate, grade and color of adjacent concrete masonry units.
- C. Brick units for bearing, leveling and filling.
- D. Bullnose units with 1 inch radius corner.
- E. U-block and bond beam units.

2.03 MORTAR

- A. See Specification Section 04100 - Mortar.

2.04 STEEL REINFORCEMENT

- A. See Specification Section 04160 - Masonry Reinforcement.

2.05 GROUT

- A. Grout for reinforced masonry shall have a minimum compressive strength of 2,500 psi at 28 days and shall comply with requirements of ASTM C150.
- B. Portland Cement, Type 1, and shall comply with the requirements of ASTM C150.
- C. Fine aggregates for grout shall comply with the requirements of ASTM C404.
- D. Coarse aggregates for grout shall be pea gravel, 3/8" diameter maximum.
- E. Water shall be clean, fresh and potable.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Bond: Running bond
- B. Tooling: Smooth concave joints for all areas
- C. Placing:
 - 1. Set units plumb and true to line with level, accurately spaced and coordinated with other work.
 - 2. Lay CMU units with full-face shell mortar beds.
 - 3. Fill vertical head joints solidly with mortar from face of unit to a distance behind face equal to not less than the thickness of the longitudinal face shells.
 - 4. Solidly bed cross-webs of starting courses in mortar.
 - 5. Provide 3/8 inch joints unless otherwise shown.
- D. Bond Beams:
 - 1. Use special units or modify regular units to allow for placement of continuous horizontal reinforcing bars as indicated.
 - 2. Place wire screening or expanded metal lath in mortar joints under bond beam courses over non-reinforced vertical cores, or provide units with solid bottoms.

- E. Pilasters:
 - 1. Lay wall and pilaster units together to maximum pour height shown.
 - 2. Pilaster units shall provide minimum clearances and grout coverage for number and size of vertical reinforcement as indicated.
- F. Bullnose Units:
 - 1. Install at all exposed vertical corners, unless otherwise indicated.
 - 2. Install at all exposed horizontal edges, unless otherwise indicated.
- G. Square Edge Units:
 - 1. Use only where specifically noted as allowed in lieu of bullnose edges.
 - 2. All exposed square edge block units must be formed using a Universal Press Top (UPT) mold.
- H. Build masonry construction to the full thickness shown, except build single-wythe walls to the actual thickness of the masonry units, using unit of nominal thickness as indicated or specified.
- I. Cut masonry units with motor-driven saw designed to cut masonry, with clean, sharp, unchipped edges. Use full units without cutting wherever possible. Use dry cutting saws to cut concrete masonry units.
- J. Maintain vertical continuity of core or cell cavities which are to be reinforced or grouted, to provide minimum clearance and grout coverage for vertical reinforcing bars. Solidly bed webs in mortar where adjacent to reinforced cores.
- K. DO NOT WET concrete masonry units.
- L. Use no piece shorter than 8 inches.
- M. Bond all corners in each course.
- N. All masonry walls shall be laterally braced by the Contractor as required until all structural framing and decking have been installed in units of construction adjacent to the walls.
- O. As the work progresses, install all built-in items as specified under this or any other Section.

3.02 GROUTING

- A. Contractor may use either low-lift or high-lift grouting techniques, subject to the following requirements.
- B. All masonry units located below grade shall be grouted solid, whether indicated or not.
- C. Low Lift Grouting:
 - 1. Vertical cells to be filled shall have vertical alignment sufficient to maintain a clear, unobstructed continuous vertical fall measuring not less than 2 inches by 3 inches.
 - 2. Units must be laid to a height not to exceed 8 feet. If height exceeds 4 feet, cleanouts must be used. Stop pour at course below bond beams.
 - 3. Place vertical steel into cells with enough steel extending to provide lap splice of 48 bar diameters or as indicated on drawings.
 - 4. In grouting vertical cells, stop grout 1-1/2 inches below top of unit or over horizontal steel which shall be fully embedded in grout.
 - 5. Place grout continuously, using a chute or container with spout. Rod or vibrate grout during placing. Do not interrupt placing of grout for more than 1 hour.
 - 6. Place horizontal bond beam reinforcement as the masonry units are laid. Lap at corners and intersections. Place grout in bond beams before filling vertical cores above bond beams.

7. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist displacement of masonry units and breaking of mortar bond. Reinforce or brace cleanouts to resist grout pressure.
8. Prior to grouting, inspect and clean grout spaces. Clean top surfaces of all structural members supporting masonry to ensure bond.

D. High-Lift Grouting:

1. All paragraphs and items for Low-Lift Grouting above apply to this section, with the exception of the limitation of height that units must be laid to.
2. Limit grout pours to sections which can be completed in one working day with not more than one hour interruption of pouring operation. Place grout in lifts which do not exceed 4 feet. Allow not less than 30 minutes nor more than one hour between lifts of a given pour. Rod or vibrate each grout lift during pouring operation.
3. Place grout by pumping into grout spaces. Alternate placing methods shall be approved by the Architect/Engineer.
4. Vertical reinforcement shall be held in position at top and bottom and at intervals not exceeding 6 feet.
5. Minimum cell dimension shall be 3 inches for high-lift grouting.
6. Provide clean-out (inspection hole) at base of wall, below finish floor elevation, to verify reinforcing alignment and grout placement.

3.03 FORMWORK AND SHORES

- A. Provide temporary formwork and shores as required for temporary support of reinforced masonry elements. Design, erect, support, brace and maintain formwork properly.
- B. Construct formwork to conform to shape, line and dimensions as shown.
- C. Forms and/or shores shall not be removed until reinforced masonry member has hardened sufficiently to carry its own weight and all other loads that may be placed on it during construction.
- D. Provide bracing adequate to resist wind loads, bracing shall remain in place until metal roof and floor deck installation and attachment to masonry walls is completed.

3.04 REPAIR, POINTING AND CLEANING

- A. By brushing, stoning, rubbing, detergent and water, or other approved method.
- B. Remove and replace masonry units that are loose, chipped, broken or otherwise damaged. Provide new units to match adjoining and adjacent units, and install in fresh mortar or grout, pointed to eliminate evidence of replacement.
- C. During the tooling of joints, enlarge any voids or holes and completely fill with mortar. Point-up all joints to provide a neat, uniform appearance.
- D. Clean exposed CMU masonry by dry brushing at the end of each day's work and after final pointing to remove mortar spots and droppings. Comply with recommendations in NCMA TEK Bulletin No. 28.

SUBMITTAL CHECKLIST

1. Product Data.
2. Color Samples.

END OF SECTION 04220

SECTION 04510 - MASONRY PROTECTION AND CLEANING

PART 1 - GENERAL

1.01 WORK INCLUDED

Furnish labor, materials, equipment, special tools, supervision and services required to protect masonry materials and masonry work and to complete the cleaning of masonry work.

1.02 RELATED WORK

Section 04100 - Mortar

Section 04220 - Concrete Unit Masonry

1.03 DELIVERY, STORAGE AND HANDLING

A. Store masonry and mortar materials in a high, dry location and in such a manner as to prevent absorption of moisture from the ground.

1. Cover materials completely with waterproof covering securely tied or weighted in place.
2. Store accessory items to prevent damage from construction operations and elements.

1.04 SUBMITTALS

A. Manufacturer's Literature:

1. Manufacturer's data sheets, cutsheets and materials description.

PART 2 - PRODUCTS

2.01 CLEANING COMPOUND

A. Provide one of the following approved products (as applicable to specific project conditions):

1. Concrete Block:
 - a. "ProSoCo", Sure Klean #600.
 - b. "ProSoCo", Enviro Klean Safety Klean.
 - c. "Sonneborn", Sonokleen 88.
 - d. "EaCo Chem", NMD 80.

2.02 MATERIALS

A. Use cleaning product especially formulated for cleaning the particular masonry materials involved.

1. Use only non-staining and non-corrosive products.

PART 3 - EXECUTION

3.01 PROTECTION

A. When masonry work has been stopped for the day, courses shall be leveled and all joints, other than required cavities, shall be well filled with mortar.

B. Protect masonry in place from rain with waterproof coverings securely fastened in place, until roof coverings, copings, flashing, or other permanent protection of the top of walls is in place.

C. Protect all masonry protections from damage by use of wood covers or protective barricades.

3.02 COLD-WEATHER PROTECTION

- A. When ambient temperature is below 40°F the temperature of the masonry when laid shall not be less than 40°F.
1. Thaw frozen sand before use. Do not scorch.
 2. The temperature of the mixed mortar to be at least 70°F but not more than 120°F.
 3. Do not exceed a mixing water temperature of 160°F.
 4. Do not use admixtures or anti-freeze compounds for the purpose of reducing the freezing temperature of mortar.
- B. When the ambient temperature is below 20°F, heat masonry units to 40°F. Maintain a temperature of at least 40°F on both sides of the wall for not less than 48 hours.

3.03 HOT WEATHER PROTECTION

- A. In hot dry weather, wet the mortar board and cover mortar to retard the drying out of the mortar.
- B. When the ambient temperature is above 80°F, mortar which dries too rapidly may be retempered with the addition of small quantities of water. Discard mortar if more than 2 hours after mixing.

3.04 CLEANING

- A. After all masonry work is completed, repair and point all defective work to the Architect's approval.
1. Clean all exposed new work with masonry cleaning products used in accordance with the manufacturer's printed instructions.
 2. Protect all sash and other corrodible materials.

SUBMITTAL CHECK LIST

1. Manufacturer's Literature.

END OF SECTION 04510

SECTION 05120 - STRUCTURAL STEEL

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work specified in this section.
- B. This section includes furnishing all structural steel, related materials, labor, tools, equipment and services necessary for the fabrication, delivery to the site, unloading, handling, storing and erecting of all structural steel shown on the drawings, and/or specified herein.

1.02 RELATED DOCUMENTS

- A. Comply with the provisions of the latest editions of the following Codes, Specifications and Standards, except as otherwise shown or specified herein.
 - 1. A.I.S.C. "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. A.I.S.C. "Specification for Structural Steel Buildings."
 - 3. A.I.S.C. "Specification for Structural Joints Using High Strength Bolts."
 - 4. AWS "Structural Welding Code."

1.03 SHOP DRAWINGS

- A. Shop drawings shall be checked by the contractor and submitted to the Architect for review in conformance with "Special Provisions" and General Notes before fabrication is begun.
- B. The shop drawings shall include the following:
 - 1. Complete details and schedules for the fabrication of each member.
 - 2. Complete details, schedules, procedures and diagrams showing sequence of erection.
 - 3. Each member shown on the shop drawings shall be marked in such manner that the member designations on the drawings coincide with the member designations on the member in the field.
 - 4. Complete anchor bolt setting plan for use in setting anchor bolts and leveling plates/nuts under Section 03300.

PART 2 - PRODUCTS

2.01 STEEL MATERIALS AND COATINGS

- A. Unless otherwise shown or specified, rolled steel plates, shapes (except WF and WT), bars, rods and miscellaneous items shall be structural quality carbon steel complying with ASTM A36 (minimum yield 36,000 PSI). Wide flange and WT shapes only shall comply with ASTM A992 (minimum yield 50,000 PSI).
- B. Square and rectangular hollow structure section (HSS) steel members shall comply with ASTM A500, Grade B (minimum yield 46,000 PSI).
- C. Round hollow structure section (HSS) steel members shall comply with ASTM A500, Grade B (minimum yield 42,000 PSI).

- D. High strength threaded fasteners shall be heavy hexagon structural bolts, heavy hexagon nuts and washers complying with ASTM F1852 (A325) – twist-off-type tension-control bolts.
- E. Anchor rods shall comply with ASTM F1554, GR. 36. Provide heavy hexagon structural nuts and washers as required.
- F. Welded headed studs to be used as concrete anchors shall be low carbon steel solid fluxed studs complying with ASTM A-108 with a minimum $F_u = 60$ KSI. They shall be automatically end welded.
- G. Electrodes for manual shield and metal-arc welding shall be covered mild steel electrodes complying with AWS Code.
- H. Electrodes and flux for submerged arc welding shall be bare mild steel electrodes and fluxes complying with AWS Code.
- I. Exterior exposed structural steel hot-dipped galvanized, including fasteners.
- J. Washers for high strength bolts shall be flat circular hardened steel washers conforming to ASTM F436.
- K. Remove all rolling marks and I.D. marks on exposed steel members.

PART 3 - EXECUTION

3.01 FABRICATION

- A. Fabricate items of structural steel in accordance with the requirements of A.I.S.C. Specifications and as indicated on the final shop drawings.
- B. Properly mark and match-mark all materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize the field handling of materials.

3.02 CONNECTIONS

- A. Bolts in connections not within the slip-critical category shall be tightened to the snug tight condition, as defined in paragraph 8 (c) of the "Specification for Structural Joints Using ASTM High Strength bolts".
- B. Bolts in connections within the slip-critical category shall be tightened using the turn-of-nut method, as defined in paragraph 8 (d) (1) of the "Specification for Structural Joints Using ASTM High Strength bolts".
- C. All shop connections for beams and minor parts shall be welded.
- D. All field connections for beams and minor parts shall be bolted, where possible. Short slotted holes in beam web shall be detailed for beam connections where possible.

- E. Details shown on the plans are to illustrate general methods of connection and do not necessarily include all pieces required to complete the work. Such pieces are to be furnished as specified and/or required to complete the work.
- F. Connections not shown on the drawings shall be designed by the steel supplier in accordance with the AISC "Manual of Steel Construction"(14th Edition). Standard double-angle bolted and/or welded connections shall be provided, unless otherwise indicated on drawings. Simple span connections for beams shall be designed for one-half the beam load capacity as given in AISC Table 3-6 "Maximum Total Uniform Load".
- G. Length of connection angles for beam-to-column or beam-to-beam connections shall be the largest standard length less than or equal to the "T" dimension of the beam. Standard lengths and available strength of connection angles are found in "A.I.S.C. Manual of Steel Construction (14th Edition), Tables 10-1 thru 10-3.
- H. Welds shall be made only by operators who are qualified as prescribed in the "Standard Qualifications Procedure" of the American Welding Society. The Contractor shall furnish the Architect with documents establishing the qualifications of welders involved in the work.
- I. Holes for the connection of all structural steel work, including slotted holes, shall be punched or drilled in the shop. Any additional holes not shown on the shop drawings shall be approved by the Engineer and shall be drilled in the field.
- J. All welds shall be pre-qualified in accordance with AWS D1.1.

3.03 SHOP PAINTING AND CLEANING

- A. Before shipping from the shop all steel shall be cleaned. Remove heavy rust and mill scale, spatter, slag or flux deposits. Comply with Steel Structures Painting Council SP-2 "Hand Tool Cleaning" or SP-3 "Power Tool Cleaning" or SP-7 "Brush-Off Blast Cleaning." Remove oil, grease and similar contaminants; comply with SSPC SP-1 "Solvent Cleaning."
- B. All exterior exposed structural steel shall be hot dip galvanized.

3.04 FLAME CUTTING

- A. There shall be no flame cutting in the field without the approval of the Architect. If cutting is approved, cut members shall be finished in a manner and to an appearance acceptable to the Architect.

3.05 ERECTION

- A. The erection of structural steel and related work shall comply with A.I.S.C. Specifications, Code of Standard Practice and as specified herein.
- B. Maintain work in a safe and stable condition during erection. Provide temporary shoring and bracing members as required, with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment and stability of the structure as erection proceeds.

- C. The contractor under this Section shall furnish all anchor bolts, nuts, washers, leveling plates and other connections required for securing structural steel to other in-place work.
- D. Anchor bolts furnished under this Section shall be placed under Section 03300. Before starting the work, this contractor shall inspect and approve work done under Section 03300. It shall be the responsibility of the contractor under Section 03300 to correct any work not acceptable to receive work to be done under this Section.
- E. Touch-up any damaged galvanizing on exterior exposed structural steel with zinc chromate paint containing a minimum of 6% zinc chromate solids.

3.06 FIELD ASSEMBLY

- A. Set structural columns and beams accurately to lines and elevations indicated. Align and adjust the various members forming a part of the complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
- B. Level and plumb individual members of the structure to an accuracy established under Section 7.12, Frame Tolerances, of the A.I.S.C. Code of Standard Practice adopted effective April 14, 2010.
- C. Do not enlarge unfair holes in members by burning or by the use of drift pins. Holes that must be enlarged to admit bolts shall be reamed.
- D. Splice members only where shown or indicated on approved shop drawings.

SUBMITTAL CHECK LIST

- 1. Shop and setting drawings.

END OF SECTION 05120

SECTION 05210 - STEEL JOISTS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work specified in this section.
- B. This section includes furnishing all steel joist, joist girders, related materials, labor, tools, equipment and services necessary for the fabrication, delivery to the site, unloading, handling, storing and erecting of all steel joist shown on the drawings, and/or specified herein.

1.02 RELATED DOCUMENTS

- A. Comply with the provisions of the latest editions of the following Codes, Specifications and Standards, except as otherwise shown or specified herein.
 - 1. A.I.S.C. and SJI "Standard Specifications and Load Tables for Open Web Steel Joists and Joist Girders."
 - 2. AWS "Structural Welding Code." D1.1
 - 3. Specification Section 05120

1.03 SUBMITTALS

- A. Shop Drawings
 - 1. Prior to fabrication, shop drawings shall be checked by the contractor and submitted to the Architect for review.
 - 2. Shop drawings shall include joist layout, erection details, connection details, bridging details, mark, type and location.
 - 3. Each member shown on the shop drawings shall be marked in such manner that the member designations of the drawings coincide with member designations on the member in the field.
 - 4. All steel joists and joist girders shall be produced by an S.J.I. member or shop drawings shall bear the seal and signature of an engineer licensed in the state where the joists will be erected, who shall certify that the joists are designed and fabricated in accordance with the A.I.S.C. and S.J.I. specifications.
 - 5. Review of shop drawings shall be for conformance with the contract documents regarding arrangement and sizes of members and the contractor's interpretation of the design loads and contract document details. Such review shall not relieve the contractor of full responsibility for the design of the steel joists and joist girders.

PART 2 - PRODUCTS

2.01 MATERIALS AND MANUFACTURE

- A. Joist shall be welded construction of one manufacturer throughout and shall conform to current standard specifications for open web steel joist of the Steel Joist Institute and the American Institute of Steel Construction. They shall be of the type, sizes and spacing shown on the drawings.
- B. Joist shall be sprayed or dipped with one shop coat of gray paint standard with the manufacturer.

- C. Joist shall have ceiling extensions or extended bottom chords wherever ceilings of any type are to be installed beneath same, and/or where indicated on the drawings, or otherwise specified herein.
- D. Design of steel joists shall be performed by a licensed professional engineer and shall be the sole responsibility of the contractor/joist manufacturer.
- E. Joist manufacturer shall design roof joists for a net uplift (due to wind loading) of 25 PSF (ASD). Diagonal bridging or bracing to laterally brace the bottom chord shall be provided as required.
- F. Steel joists designated "special" (special, non-standard) shall be designed by the manufacturer for the loads indicated on the drawings. Design shall conform to AISC and SJI standard specifications and shall be performed by a registered professional engineer.
- G. Provide additional L2x2x3/16 diagonals and field weld at all points where equipment is hung from the chords of the joists. The angle shall extend from the point of load application to the closest panel point in the opposite chord member.
- H. Provide misc. angle framing between joists as on the "Typical Roof Opening" details at all roof drains and misc. roof penetrations.

PART 3 - EXECUTION

3.01 BEARING AND ANCHORAGE

- A. Ends of joist bearing on steel supports shall be connected thereto with two 1/8 inch fillet welds 2 inches long unless otherwise shown or noted. Bolt joists as required per OSHA requirements. Refer to section 05120 for additional welding requirements.
- B. Minimum bearing on masonry shall be 4 inches.
- C. Ends of joists bearing on masonry shall be welded to the embedded plates with two 1/8 inch fillet welds 2" long unless otherwise shown or noted.

3.02 BRIDGING

- A. Bridging shall be as required by the A.I.S.C. and SJI Standard Specifications and/or as indicated on plans.
- B. Bridge joist immediately after erection and before construction loads are applied.
- C. The ends of bridging lines terminating at masonry walls shall be anchored by strap anchors attached to the wall.

3.03 HANDLING AND ERECTION

- A. Care shall be exercised at all times to avoid damage through careless handling during unloading, storing and erecting. Dropping of joist shall not be permitted and shall be cause for rejection.
- B. Place and secure steel joist as shown on plans in accordance with A.I.S.C. and SJI Specifications and as specified herein.
- C. Install joists straight, plumb and properly aligned.
- D. Immediately after installation, clean field welds and abraded areas of shop paint and paint such areas with same material as used for shop painting to restore the protective coating to conditions equal to undamaged surfaces. Do not apply paint until field weld has inspected and approved.

SUBMITTAL CHECK LIST

1. Shop and setting drawings.

END OF SECTION 05210

SECTION 05310 - METAL ROOF DECKING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, supervision and services required to fabricate, deliver, unload, handle, store and erect all metal roof decking, including accessories, as indicated, noted, detailed and scheduled on the Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 05100 - Structural Steel
- Section 05210 - Steel Joists
- Section 05500 - Miscellaneous Metals
- Section 09900 - Painting

1.03 QUALITY ASSURANCE

- A. Comply with the applicable portions of the latest additions of the following codes, specifications, standards and publications:
 - 1. "Specifications for the Design of Cold-Formed Steel Structural Members", AISC.
 - 2. "Steel Deck Design Manual", SDI.
 - 3. "Basic Design Specifications", SDI.
 - 4. "Structural Welding Code", AWS.

1.04 REFERENCES

- A. Publications of the following institutes, associations, societies and agencies are referenced in this Section.
 - 1. American Society for Testing and Materials, ASTM.
 - 2. Steel Deck Institute, SDI.
 - 3. American Iron and Steel Institute, AISI.
- B. All metal decking and accessory items shall be domestic products and materials. Imported products will not be approved, allowed or used.

1.05 SUBMITTALS

- A. Shop Drawings:
 - 1. Prior to fabrication, furnish to the Architect/Engineer for his approval, complete shop and field erection drawings.
 - 2. Shop drawings shall include deck layout, orientation, profile, location, size, quantities, type, marking, dimensions, spacing, erection details, connection details, materials, gauges and sizes, supplementary framing, special jointing and accessories.
 - 3. Indicate method of connecting, anchoring, fastening and attachment of work of other trades.
 - 4. Indicate by dimensions, locations and sizes of holes to be cut, type of closures and fittings.
- B. Certifications:
 - 1. Provide materials certification including origin of steel. Provide evidence and certification of use of United States Steel products.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Arrange deliveries in sufficient quantities to permit continuity of installation.
- B. Store on blocks off ground and cover to prevent rusting, denting and damage to materials or structure.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Metal Decking:
 - 1. Metal Dek Group
 - 2. Vulcraft
 - 3. Nurcor

- B. Mechanical Fasteners:
 - 1. Hilti.
 - 2. Buildex, Inc.

2.02 MATERIALS

- A. Materials shall conform to the following requirements:
 - 1. ASTM Designation A611 for Grade C.
 - 2. ASTM A653-09 Structural Quality Grade 33 or higher.

- B. Metal Roof Decking:
 - 1. Basic steel shall be flat rolled, sheets of structural quality with minimum yield of 33,000 psi, and working stress not to exceed 20,000 psi.
 - 2. Decking shall be sheet steel, factory primed baked enamel finish, gray on top, white on bottom.
 - 3. Provide a minimum section modulus shall be .234 in.3.
 - 4. Sheets shall be continuous for at least 3 spans, where possible.
 - 5. Accessories shall be standard with the manufacturer and shall be furnished as necessary to complete the roof deck installation.
 - 6. Design and profile shall be 1-1/2", 20 gauge metal deck, Type B with a fabricated valley spacing of 6 inches in accordance with latest edition of Steel Deck Institute Design Manual.

- C. Provide and install accessory items as required to complete installation:
 - 1. 18 gauge steel bent plates and closures.
 - 2. Steel supports for roof openings over a distance of 12 inches.

- D. Design:
 - 1. Maximum fiber stress shall not exceed 20,000 PSI under a total dead and live load of 50 PSF.
 - 2. Deflection shall not exceed 1/360 of the span under a live load of 40 PSF, nor shall it exceed 1/240 of the span under a total dead and live load of 50 PSF.
 - 3. Technical literature showing the configuration, load capacity, section properties and other pertinent data shall be submitted as a part of the shop drawings.

PART 3 - EXECUTION

3.01 FIELD MEASUREMENTS

- A. The Contractor is responsible for obtaining all necessary field measurements at the project site and will be held responsible for their accuracy and for the accurate fitting of this work with the work of others.

3.02 PROTECTION, STORAGE AND HOISTING

- A. The metal roof decking shall be protected against damage in transit to the job site.

- B. If site storage is necessary, metal roof decking shall be stacked on wood blocking clear of the ground and sloped slightly to insure against the entrapment of water.

- C. Hoisting of the metal roof decking to floor designated on the shop drawings shall be done in such a manner as to not damage the material and placed to provide as little rehandling as possible.

3.03 INSTALLATION

- A. Installation shall be in strict accordance with the final shop drawings and requirements herein. Decking units shall be handled in such a manner as to avoid damaging the units. Decking units shall be placed only over supports which have been accurately aligned and secured in position.
- B. Install decking level and true to a line according to details of approved setting drawings. Install decking with ribs perpendicular to bearing. Shop cut ends to correct angle to meet bearings.
- C. If connection notes and details are not indicated on the drawings, secure decking to supporting steel members by use of mechanical fasteners only. Welding attachment is not acceptable.
 - 1. Self-drilling and tapping fasteners.
 - 2. Install fasteners in strict accordance with manufacturer's specifications.
 - 3. Fastener Schedule:
 - a. #12 x 1-1/4", Type 5 point for deck to steel joist, angles or structural steel.
 - b. #14 x 7/8", Type 1 point for deck to deck side laps (stitching).
 - 4. Fastener spacing:
 - a. 6 inches on center, maximum, at end laps.
 - b. 12 inches on center, maximum, at intermediate supports.
 - c. 15 inches on center, maximum, at side laps of adjacent units.
 - d. Provide a minimum 2 fasteners on side laps between supports.
- D. End Laps:
 - 1. 2 inch minimum and occur over supports.
 - 2. Laps shall be tight but made without stretching.
- E. Side Laps:
 - 1. Make by "nesting" to interlock with adjacent sheets.
 - 2. Attach edges with mechanical fastener supports.
 - 3. Laps shall be tight but made without stretching.
- F. Openings:
 - 1. Cut and neatly fit deck units and accessories around other work projecting through or adjacent to decking.
 - 2. Reinforce decking around openings with sheet steel.
 - 3. No openings larger than 12 inches x 12 inches will be permitted without support by structural steel framing.
- G. Provide accessories necessary for proper installation.
 - 1. Secure accessories to decking as recommended by manufacturer of decking.
 - 2. Install items specified in other sections as furnished for installing with decking.
- H. Attention is called to the fact that the metal decking is designed for diaphragm action. Therefore, added care must be taken to ensure proper installation procedures.

3.04 TOUCH-UP

- A. Touch-up all scratched, abraded or rubbed spots with primer paint.

3.05 CLEAN-UP

- A. Remove foreign matter and clean decking to satisfactory conditions to receive specified finish.

3.06 INSPECTION

- A. The contractor shall retain a testing company to ensure and certify that the deck is fastened properly, prior to placement of cover materials.

- B. Written approval of deck installation is required prior to proceeding with construction.

SUBMITTAL CHECK LIST

- 1. Complete shop fabrication drawings.
- 2. Complete erection drawings.
- 3. Materials certification including origin of steel.

END OF SECTION 05310

SECTION 05400 - LIGHTGAGE METAL FRAMING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. All exterior steel stud construction as shown on Drawings and specified herein.
- B. All load bearing interior steel stud construction as shown on Drawings and specified herein.
- C. See Section 09250 - Gypsum Drywall for all framing for non-load bearing interior partitions and framing.
- D. Furnish labor, materials, equipment, special tools, supervision and services required to fabricate, deliver and erect all Lightgage Metal Framing indicated noted and detailed on Drawings and specified herein.
- E. The extent of work is shown on the drawings using a C steel stud and joist system.
All connections are welded.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 05100 - Structural Steel
- Section 05210 - Steel Joists
- Section 05310 - Metal Roof Decking
- Section 05500 - Miscellaneous Metals

1.03 QUALITY ASSURANCE

- A. All shop and field welders must hold a current and valid certificates issued by the American Welding Society.
- B. Component Design: Compute structural properties of studs and joists in accordance with AISC "Specification for Design of Cold-Formed Steel Structural Member".
- C. Product Designation:
 - 1. As specified in the AISI standard for cold formed steel framing General provisions A5.2
 - 2. Four-part identification code. Example: 600S162-43
 - a. 600 6"
 - b. S Stud or Joist Section
 - c. 162 1.625" flange width
 - d. 43 .043" mill thickness

1.04 SUBMITTALS

- A. Submit manufacturer's product information and installation instruction for each item of lightgage framing and accessories.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Arrange deliveries in quantities to permit continuity of installation.
- B. Store on blocks off ground and cover to prevent rusting, denting and damaging to materials or structure.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide products from one of the following manufacturers, or an approved equivalent:
1. "U.S. Gypsum Company" (USG).
 2. "National Gypsum Company".
 3. "Georgia-Pacific".
 4. "Clark Dietrich Building Systems".
 5. "Phillips Manufacturing Co.".
 6. "Marino/Ware".
 7. "CEMCO Steel".
 8. "Flex-Ability Concepts".
 9. "MBA Metal Framing".
 10. "Dale/Incor".
 11. "Superior Steel Studs".

2.02 SYSTEM COMPONENTS

With each type of metal framing required, provide manufacturer's standard runners (tracks), shoes, clips, ties, stiffeners, fasteners, grommets to protect electrical wiring, and accessories as recommended by the manufacturer for the applications indicated, as needed to provide a complete metal framing system, and as otherwise indicated.

2.03 STUDS

- A. Manufacturer's C steel studs complying with ASTM A446, of the height, size and gauge indicated; with punched webs to facilitate erection of system and passage of mechanical/electrical service lines.
- B. Thickness: as indicated on Drawings.
- C. Depth of Section: as indicated on Drawings.
- D. Flange Width: Not less than 1.625" (1-5/8").
- E. Steel and Finish: ASTM A 446-76, Galvanized Steel, Class A.
- F. Face of Flanges: Knurled to facilitate use of self-drilling, self-tapping fasteners.
- G. Lateral Bracing: 1-1/2" cold rolled channels.
- H. Deflection Stud Runners:
1. Equal to: "Clark Dietrich Building Systems", SLP-TRK.
 2. Positive attachment secured through sides of track, to allow up to 1" vertical movement.
 3. Match gauge, depth and section of associated vertical metal stud wall members, minimum 20 gauge and 30 mils thickness.
 4. Flange/leg size not less than 1.25 inches.

2.04 FABRICATION

- A. Framing components may be prefabricated into panels prior to erection. Fabricate panels plumb, square, true to line and braced against racking with joints welded. Perform lifting of prefabricated panels in a manner to prevent damage or distortion.
- B. Attach similar components by welding. Attach dissimilar components by welding or bolting as standard with manufacturer and approved by the architect.

- C. Wire tying of framing components is not permitted.

PART 3 - EXECUTION

3.01 INSPECTION AND PREPARATION

- A. Prior to the start of installation of lightgauge metal framing system, meet at the project site with the installers of other work including E.I.F.S., metal panel, mechanical, and electrical work. Review areas of potential interference and conflicts, and coordinate layout and support provisions for interfacing work.

3.02 INSTALLATION

- A. Install lightgauge metal framing in accordance with manufacturer's printed or written instruction and recommendations, unless otherwise indicated.
- B. Runner Tracks:
 - 1. Install continuous tracks sized to match studs.
 - 2. Align tracks accurately to the layout at base and tops of studs.
 - 3. Secure tracks as recommended by the stud manufacturer for the type of construction involved, except do not exceed 24 inches o.c. spacing for nail or power-driven fasteners, nor 16 inches o.c. for other types of attachment.
 - 4. Provide fasteners at corners and ends of tracks.
- C. Where stud systems abut ceiling or deck construction or vertical structural elements, provide slip or cushion-type joint between stud system and structure as recommended by stud manufacturer to prevent the transfer of structural loads or movements to stud systems.
- D. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.
- E. Where stud system abuts structural columns or walls, anchor ends or stiffeners to supporting structure.
- F. Install supplementary framing, blocking and bracing in the metal stud system wherever indicated to support fixtures, services, heavy trim and similar work requiring attachment to the system. Where type of supplementary support is not otherwise indicated, comply with the stud manufacturer's recommendations and industry standards in each case, considering the weight or loading resulting from the item supported.
- G. Install continuous horizontal lateral bracing at 5'-0" o.c. in all exterior walls, and where recommended by manufacturer.
- H. Frame both sides of expansion and control joints with a separate stud and do not bridge the joint with components of the stud system.
- I. Where soffits abut other construction, install vertical runner track anchored not more than 24 inches o.c. to other construction.
- J. At soffit corners and intersections, install a minimum of 3 studs to provide support for each surface. Space studs 2 inches away from internal corner lines to finished partition.
- K. Except as otherwise indicated space studs at 16 inches o.c.

- L. If welding is required for connection to structural or miscellaneous steel, noted on the drawings or contractor elects to weld, it shall be in accordance with stud manufacturer=s recommendations.

SUBMITTAL CHECK LIST

1. Manufacturer's specifications.
2. Manufacturer's installation instructions.

END OF SECTION 05400

SECTION 05500 - MISCELLANEOUS METALS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Miscellaneous metals include items made from iron and steel shapes, plates, bars, strips, tubes, pipes and castings which are not a part of structural steel or other metal systems specified elsewhere.
- B. Types of work in this section include, but are not limited to the following:
 - 1. Steel Brackets.
 - 2. Loose Steel Lintels.
 - 3. Miscellaneous Framing and Supports.
 - 4. Steel Concrete Inserts.
 - 5. Pipe Bollards.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 03300 - Cast-In-Place Concrete
- Section 05100 - Structural Steel
- Section 05210 - Steel Joists
- Section 05310 - Metal Roof Decking

1.03 QUALITY ASSURANCE

- A. Comply with the applicable requirements of the following manuals, specifications and codes:
 - 1. "Specification for Design, Fabrication and Erection of Structural Steel for Buildings", AISC.
 - 2. "Code for Arc and Gas Welding in Building Construction", AWS.
 - 3. "Structural Steel Detailing", AISC.

1.04 REFERENCES

- A. Publications of the following institutes, associations, societies and agencies are referred to in this Section.
 - 1. American Society for Testing and Materials, ASTM.
 - 2. National Association of Architectural Metals Manufacturers, NAAMM.
 - 3. Steel Structures Painting Council, SSPC.
 - 4. American Welding Society, AWS.
 - 5. American Institute of Steel Construction, AISC.
- B. All Miscellaneous Metals and fabricated items shall be domestic manufacture. Imported metals and products will not be approved or used.

1.05 SUBMITTALS

- A. Furnish to the Architect for approval, complete shop and field erection drawings.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Fabricate and deliver miscellaneous metal items in ample time to avoid delays in the progress of any trade working on the project.
- B. Store on blocks off ground and cover to prevent rusting, denting and damage to materials or structure.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials shall conform with the following requirements:
 - 1. "Structural Steel", ASTM Designation A36.
 - 2. "Low and Intermediate Tensile Strength Carbon Steel Plates of Structural Quality", ASTM Designation A283.
 - 3. "Cold-Rolled Carbon Sheets, Commercial Quality", ASTM Designation A36.
- B. Structural Steel: 36,000 psi yield point rolled to the size and shapes indicated on the drawings.
- C. Welding Electrodes: Series #70, Grade AWS-2.
- D. Primer Paint: Supplier's standard shop primer paint.

2.02 MISCELLANEOUS METAL ITEMS

- A. Miscellaneous Metal Items but are not necessarily limited to the following:
 - 1. Steel angles, shelf angles, receiving angles, lintels and miscellaneous supports requiring fabrication.
 - 2. All bolts, inserts, clip angles, struts and channel framing.
 - 3. Handrails shall be steel pipe with welded joints. All welds shall be ground smooth. Provide closure plates at ends of all rails. Return all ends to wall unless otherwise detailed.

2.03 WORKMANSHIP

- A. Workmanship required in the execution of the work shall be of the best quality and subject to the approval of the Architect.
- B. Form metal work to shape and size, with sharp lines and angles. Leave clean, true lines and surfaces when shearing or punching. Weld permanent connections where practical.
- C. Holes in structural steel framing for attaching miscellaneous metal items will be provided by the miscellaneous metal erector.

2.04 FABRICATION

- A. The Contractor is responsible for verifying all dimensions of work adjoining. Inspect such work before fabrication and/or installation of items specified. Obtain measurements of adjoining work so work will fit closely to spaces provided.
- B. Provide opening angles, lintels and miscellaneous supports shown, requiring fabricating in accordance with notes and details.
- C. The fabricator shall furnish all necessary templates and patterns required by other trades. Also furnish all items except otherwise specified, pertaining to work under other sections.

2.05 SHOP PAINTING

- A. Clean all ferrous metals of all rust, scale, oil, grease or other foreign matter in accordance with SSPC Specification SP2-63.
- B. After cleaning apply one coat Type 1, oil alkyd, red oxide to minimum 2 mil dry film thickness

- C. All exterior miscellaneous steel to be hot dipped galvanized.
 - 1. Hot dip galvanizing per ASTM A123, min. 2.0 ounces per square foot.
 - 2. Touch up primer: SSPC 20, Type I inorganic zinc rich.

PART 3 - EXECUTION

3.01 FIELD MEASUREMENT

- A. The Contractor is responsible for obtaining all necessary field measurements at the job site and will be held responsible for their accuracy and for the accurate fitting of this work with the work of others.

3.02 GENERAL

- A. Perform all cutting, fitting and drilling necessary to properly set the work herein specified and as required for proper installation of adjacent or engaging work of all trades.

3.03 ADJUST AND CLEAN

- A. Touch Up Painting:
 - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting.
 - 2. Apply to provide a minimum dry film thickness of 2.0 mils.

SUBMITTAL CHECK LIST

- 1. Shop and setting drawings.

END OF SECTION 05500

SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, supervision and services required to complete all rough carpentry work indicated, noted and detailed on drawings and specified herein including:
1. Framing, blocking and furring.
 2. Wood treatment.
 3. Fasteners in treated wood.
 4. Blocking as required for items such as casework, cabinets, toilet accessories, lockers, and any other items requiring wood blocking for support, bracing, mounting, and securing in place

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 06200 - Finish Carpentry
Section 08710 - Finish Hardware
Section 09900 - Painting
Section 10500 - Lockers
Section 12325 - Plastic Laminate Cabinets and Casework

1.03 QUALITY ASSURANCE

- A. Grading Rules:
1. Lumber grading rules and wood species shall conform with Voluntary Product Standard PS-20. Grading rules of the following associations shall also apply to materials produced under their supervision.
 - a. Northeastern Lumber Manufacturer's Association, Inc. (NELMA).
 - b. Southern Pine Inspection Bureau (SPIB).
 - c. West Coast Lumber Inspection Bureau (WCLIB).
 - d. Western Wood Product Association (WWPA).
 2. Plywood shall conform to the following:
 - a. Softwood Plywood - Product Standard PS-1.
 - b. Hardwood Plywood - Product Standard PS-51.
- B. Grade Marks:
1. Identify all lumber and plywood by official grade mark.
 2. Lumber: Grade stamp to contain symbol of grading agency, mill number or name, grade of lumber, species or species grouping or combination designation, rules under which graded, where applicable and condition of seasoning at time of manufacture.
 - a. S-Dry: Maximum 15 percent moisture content.
 - b. MC-5 or KD: Maximum 15 percent moisture content.
 - c. Dense.
 3. Softwood Plywood: Appropriate grade trademark of the American Plywood Association.
 - a. Type, grade, class and identification index.
 - b. Inspection and testing agency mark.
 4. Hardwood Plywood: Appropriate grade mark of qualified inspection, testing, or grading mark.
- C. Testing:
1. ASTM E 84, maximum 25 Flame Spread rating.

D. Requirements of Regulatory Agencies:

1. Fire Hazard Classification: Underwriter's Laboratories, Inc., for treated lumber and plywood.
2. Preservative Treated Lumber and Plywood: American Wood Preservers Bureau, Quality Mark.
3. Pressure Treated Material: American Wood Preserves Bureau Standards.
4. Span Tables: National Forest Products Association.
5. Working Stresses: Softwood Lumber, National Design Specification, National Forest products Association.

1.04 SUBMITTALS

A. Submit the following:

1. Treating Plant Certification:
Submit certification by treating plant stating chemicals and process used, net amount of salts retained, and conformance with applicable standards.
2. Preservative Treated Wood:
Submit certification for water-borne preservative that moisture content was reduced to 19 percent maximum, after treatment.
3. Fire Retardant Treatment:
Submit certification by treating plant that fire-retardant treatment materials comply with governing ordinances and that treatment will not bleed through finished surfaces.
4. Fasteners Product Data:
Submit manufacturer's published literature and product data sheets.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Immediately upon delivery to job site, place materials in area protected from weather.
- B. Store materials of minimum of 6" above ground on framework or blocking and cover with protective waterproof covering, providing adequate air circulation or ventilation.
- C. Do not store seasoned materials in wet or damp areas.
- D. Protect fire-retardant materials against high humidity and moisture during storage and erection.
- E. Protect sheet materials from corners breaking and surface damage.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Lumber:

1. Dimension:
 - a. Specified lumber dimensions are nominal.
 - b. Actual dimensions conform to industry standards established by the American Lumber Standards Committee and the rules writing agencies.
2. Moisture Content:
 - a. 19 percent maximum at time of permanent closing of building or structure, for lumber 2" or less nominal thickness.
3. Surfacing:
 - a. Surface four sides (S4S), unless otherwise shown, or specified.
4. Framing Lumber:
 - a. 2" to 4" thick, 2" to 4" wide.
 - b. Any commercial softwood species, unless otherwise shown, or specified.

5. Miscellaneous Lumber:
 - a. Provide wood for support or attachment of other work including cant strips, bucks, nails, blocking, furring, grounds, stripping and similar members.
 - b. Provide lumber of sizes shown or specified, worked into shapes shown on Drawings.
 - c. 15 maximum moisture content for lumber items not specified to receive wood preservative treatment.
 6. Grades:
 - a. General Framing: Standard and Better Grade.
 - b. Plates, Blocking, Bracing and nailers: Utility Grade.
 - c. Miscellaneous Lumber: Construction Grade.
- B. Plywood:
1. Exterior graded plywood where indicated, or where edge or surface is permanently exposed to weather: B-B EXT-APA, graded for treatment where preservative treated plywood is indicated.
 2. Plywood Backing Panel: For mounting electrical or telephone equipment, provide fire-retardant treated plywood panels, APA C-D PLUGGED INT with exterior glue, thickness indicated, or if not otherwise indicated, 3/4".
- C. Preservative Treated Wood:
1. Waterbourne Salt Preservatives for Painted, Stained or Exposed Natural Wood Products:
 - a. AWPB LP-2, above ground application.
 - b. AWPB LP-22, ground contact application.
 2. Treat indicated items and the following:
 - a. Wood sills, sleepers, blocking, furring, stripping, roofing, and similar concealed members in contact with masonry, concrete, or around windows and doors.
 - b. Use **MCA** (Micronized Copper Azole) preservative treatment only.
- D. Fire Retardant Treatment:
1. Comply with AWPA Standards for pressure impregnation with fire retardant chemicals.
 - a. Flame Spread: 25 max.
- E. Fasteners in Treated Wood:
1. Shall be resistant to corrosion or be protected to resist corrosion.
 2. Where sacrificial coatings are applied to fasteners, a minimum coating thickness capable of protecting the fastener for the expected service life of the structure shall be provided. Provide manufacturer's product information, test results, and certifications to substantiate these claims.
 3. Coating weights for zinc-coated fasteners shall be in accordance with ASTM A153M or ASTM A641, Supplementary Requirements.
 4. Fasteners shall be one of the following:
 - a. Stainless steel.
 - b. Standard Single-dipped, Double-dipped, Hot-dipped, or zinc-coated galvanized steel.
 - c. Silicon bronze.
 - d. Copper

PART 3 - EXECUTION

3.01 GENERAL

- A. Discard units of material with defects which might impair quality of work, and units which are too small to fabricate work with minimum joints or optimum joint arrangement.
- B. Set carpentry work accurately 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. Countersink nail heads on exposed carpentry work and fill holes.
- 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; pre-drill as required.

3.02 INSTALLATION

A. Wood Grounds, Nailers, Blocking and Sleepers:

- 1. Provide where shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached.
- 2. 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 formwork before concrete placement. Do not use power driven anchors unless approved by Architect.
- 3. Provide permanent grounds of dressed, preservative treated, key-beveled lumber not less than 1-1/2" wide and of thickness required to bring face of ground to exact thickness of finish material involved. Remove temporary grounds when no longer required.
- 4. For renovation projects utilizing existing blocking, provide additional blocking as required if existing blocking is inadequate.

- B. Apply two brush coats of same preservative used in original treatment to all sawed or cut surfaces of treated lumber.

3.03 TEMPORARY WORK

- A. Provide temporary stairs, ramps, runways, ladders, etc., as required for the purpose of handling materials, personnel and access to the work and temporary exits from the building.

3.04 CUTTING, FITTING AND PATCHING

- A. Include all cutting, fitting and patching of work in connection with other trades which adjoin any part of this work.

SUBMITTAL CHECK LIST

- 1. Treating plant certification.
- 2. Preservative treatment certificate.
- 3. Fire retardant treatment certificate.
- 4. Fasteners product data.

END OF SECTION 06100

SECTION 06200 - FINISH CARPENTRY

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Carpentry work which is exposed to view, as shown on the Drawings and specified herein.
- B. Solid Surface window sills throughout the project as indicated on the Drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 06100 - Rough Carpentry
Section 08710 - Finish Hardware
Section 09900 - Painting

1.03 QUALITY ASSURANCE

- A. Comply with the latest edition of the Architectural Woodwork Standards (AWS) "Quality Standards". References to Premium, Custom, or Economy in this specification are to be as defined in this publication.
- B. Factory mark each piece of lumber and plywood with grading information, except for surfaces to receive transparent finish.
- C. Mark each unit of fire-retardant treated lumber and plywood with Underwriter's Laboratory Classification marking.

1.04 SUBMITTALS

- A. Submit the following:
 - 1. Shop Drawings of all finish carpentry items of sufficient detail and scale to show compliance with design intent and specified quality grades.
 - 2. Samples of all finish materials for colors, patterns and finishes as specified.
For colors, patterns and finishes not specified, submit samples of manufacturer's entire selection for selection by Architect.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Protect woodwork during transit, delivery, storage and handling to prevent damage, soiling and deterioration.
- B. Do not deliver woodwork, until painting, wet work, grinding and similar operations which could damage, soil or deteriorate woodwork have been completed in installation areas.

1.06 PROJECT CONDITIONS

- A. Conditioning: Do not install woodwork until required temperature and relative humidity have been stabilized and will be maintained in installation areas.
- B. Maintain temperature and humidity in installation area as required to maintain a moisture content of installed woodwork within a 1.0 percent tolerance of optimum moisture content, from date of installation through remainder of construction period.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Solid Wood for Transparent Finish:
 - 1. Select Red Oak, AWS Premium Grade.
 - 2. Plain Sliced or Rotary Cut as selected by Architect.

- B. Veneer Wood for Transparent Finish:
 - 1. Select Red Oak, AWS Premium Grade.
 - 2. Plain Sliced or Rotary Cut as selected by Architect.
 - 3. Veneer thickness shall not be less than 1/20 in. before sanding.
 - 4. Veneer matching to be determined by fabricator, for best visual effect, depending upon flitch width and grain character.
 - 5. Refer any questions and about best visual effect to Architect for resolution as work progresses.

- C. Hardwood Plywood:
 - 1. Product Standard PS 51.

- D. Softwood Plywood:
 - 1. Product Standard PS 1.

- E. Solid Wood for Painted Finish:
 - 1. Poplar, AWS, Custom Grade.

- F. Particle Board:
 - 1. Medium Density, Type 1-M-2.
 - 2. Thickness as indicated on the Drawings. If not indicated, provide 3/4" standard.

- G. Provide kiln-dried (KD) lumber with an average moisture content range of 6% to 11% for interior work. Maintain temperature and relative humidity during fabrication, storage and finishing operation so that moisture content values for woodwork at the time of installation do not exceed 5% to 10%.

- H. Miscellaneous Materials:
 - 1. Provide nails, screws and other anchoring devices to provide secure, concealed attachment.
 - 2. Where finish carpentry is exposed to exterior or areas of high humidity, provide fasteners with hot-dipped zinc coating (ASTM-A153).

- I. Fire Treated Wood:
 - 1. ASTM - E84
 - 2. Flame Spread - 25 max.
 - 3. Kiln-dried after treatment to 15% max. moisture content.

- J. Fasteners and Anchors:
 - 1. Size and type as required for each use.
 - 2. Provide non-ferrous or hot-dip galvanized anchors and fasteners for all exterior applications.

2.02 FABRICATION

- A. Fabricate standing and running trim of solid wood for transparent and opaque finish in accordance with AWS Section 300, Premium Grade.

- B. Fabricate standing and running trim including sill, chair rail and railings to dimensions, profiles, and details shown. Rout or grove reverse side (backed-out) of trim members to be applied to flat surface,

except for members with ends exposed in finish work. Miter corners and reinforce. Miters shall be well formed and in true alignment.

- C. Fabricate flush veneer laminated paneling on interior hardwood plywood with veneer for transparent finish specified. Veneers shall be center matched. Panels shall be book matched and where they occur end to end they shall be end matched. Paneling shall conform with AWS Section 500A, Premium Grade.
- D. Closet shelving up to 12 inches in width may be cut from solid wood for painted finish, or fabricated from particle board or plywood as specified for wider shelves. Shelves greater than 12 inches in depth shall be fabricated from particle board or plywood with glued solid lumber edge band in accordance with AWS Section 600, Custom Grade.
- E. Provide solid hardwood edge banding on all exposed edges of finish carpentry.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Condition wood materials to average prevailing humidity of installation area prior to installing.
- B. Discard unsuitable materials and remove from job site.

3.02 INSTALLATION

- A. Install work in as large sizes as practical, in order to minimize the number of joints. Install trim using full length pieces from largest length lumber available. Stagger joints in adjacent and related members.
- B. Install work plumb, level, true and straight. Shim as required using concealed shims.
- C. Scribe and cut work to fit adjoining surfaces.
- D. Miter trim at corners, cope at returns. Use scarf joints for end to end joints.
- E. Install fire-retardant treated wood in accordance with manufacturer's directions and as required to meet required classification or rating. Provide special fasteners, molding, adhesives and other accessories for rating and fire-retardant material indicated.
- F. Anchor finish carpentry work to anchorage devices or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where pre-finished matching fastener heads are required, use fine finishing nail for exposed nailings, countersunk and filled flush with surface, so that nail is not noticeable after surface is painted or stained.

3.03 ADJUSTING AND CLEANING

- A. Repair or replace defective finish carpentry work to eliminate functional and visual defects.
- B. Adjust joinery for uniform appearance.
- C. Refer to Division 9 sections for final finishing.

3.04 PROTECTION

- A. Protect all work from damage until time of substantial completion.
- B. Maintain conditions necessary to prevent deterioration of work.
- C. Repair or replace damaged work and finishes.

SUBMITTAL CHECK LIST

- 1. Shop Drawings.
- 2. Samples.

END OF SECTION 06200

SECTION 07111 - BITUMINOUS COATING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Cold applied, solvent-based, coating for interior and exterior below grade steel protection.
2. Application on precast panel anchors.

B. Areas of Installation:

1. In general, this material is to be installed on the interior and exterior surface of all steel connections and anchors below grade or under floor slab.
2. Drawings indicate general intent of areas of installation, but cannot indicate or detail every specific location required.

1.02 SUBMITTALS

A. Product Data:

1. Provide manufacturer's published product data and cut sheets.
2. Provide coverage rate and rate of application.
3. Material Safety Data Sheets (MSDS).

B. Assurance/Control Submittals:

1. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
2. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original containers, dry, undamaged, seals and labels intact.

1.04 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements: Maintain ambient temperatures above 40 degrees F for 24 hours before and during application, until coating has cured.

PART 2 - PRODUCTS

2.01 MANUFACTURERS & PRODUCTS

- A. Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:

1. Benjamin Moore, "Coal Tar Epoxy"
2. Sherwin Williams, "TarGuard Coal Tar Epoxy"

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Brush or spray apply surfaces in accordance with manufacturer's published instructions.

SUBMITTAL CHECKLIST

1. Product Data.

END OF SECTION 07110

SECTION 07200 - INSULATION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Extent of insulation work is indicated on the Drawings and specified herein.
- B. Applications of insulation specified in this section include the following:
 - 1. Batt/Blanket Thermal Insulation.

1.02 QUALITY ASSURANCE

- A. Thermal Conductivity:
Thicknesses shown are for thermal conductivity (k-value at 75°F) specified for each material. Provide adjusted thicknesses as directed for equivalent use of material having a different thermal conductivity. Where insulation is identified by "R" value, provide appropriate thickness.

1.03 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's specifications and installation instructions for each type of insulation required.
 - 2. Material Safety and Data Sheets (MSDS).

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Batt/Blanket Thermal Insulation (formaldehyde, acrylic and dye free):
 - 1. Foil Faced Batts:
 - a. Provide accepted products from one of the following acceptable manufacturers:
 - 1.) "Owens Corning".
 - 2.) "USG".
 - 3.) "Johns Manville".
 - 4.) "CertainTeed".
 - b. Fiberglass Batts.
 - c. Continuous rolls in width of 16" or 24", as required to accommodate building component spacing.
 - d. Foil scrim vapor barrier facing, Class A rated, Type FSK-25.
 - e. Thickness to provide R-value indicated on drawings, or if not indicated, 6" thick, R-19.
- B. Miscellaneous Materials:
 - 1. Adhesive for bonding insulation to be type recommended by insulation manufacturer and complying with fire-resistance requirements.
 - 2. Mechanical anchors to be type and size shown, or if not shown, as recommended by insulation manufacturer for type of application and condition of substrate.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Installer must examine substrate and conditions under which insulation work is to be performed and must notify Contractor in writing of unsatisfactory conditions. Do not proceed with insulation work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General:

1. Comply with manufacturer ' s instructions for particular conditions of installation in each case. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with work.
2. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation.
3. Apply a single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness.

SUBMITTAL CHECK LIST

1. Product Data.

END OF SECTION 07200

SECTION 07410 - METAL WALL PANEL

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Metal wall panel assemblies as indicated on Drawings and specified herein.
 - 1. Includes preformed sheet metal panels, related accessories, trim, corners, miscellaneous flashing and attaching devices for a complete watertight installation.
- B. Metal Wall Panel systems specified herein include:
 - 1. Metal Wall Panel (Concealed Fasteners - Flush).
 - 2. Metal Wall Panel (Exposed Fasteners - Ribbed).

1.02 QUALITY ASSURANCE

- A. American Iron and Steel Institute - AISI. "Light Gauge Cold-Formed Steel Design Manual".
- B. American Society of Testing Materials - ASTM
 - A-116 Structural, Physical Quality of Galvanized Steel Sheet.
 - A-525 General Requirements for Galvanized Steel Sheet.
 - D-1056 Flexible Cellular Material.
 - B-209 Smooth or Stucco Embossed Prefinished Aluminum.
 - E-330-84 Test Method for Structural Performance by Uniform Static Air Pressure Difference.
- C. SMACNA - Architectural Sheet Metal Manual.

1.03 SUBMITTALS

- A. Manufacturer's Literature:
 - 1. Published materials description and specifications for each type panel specified.
 - 2. Manufacturer's installation instructions for each type panel specified.
- B. Samples:
 - 1. 12" x 12" section of metal panel.
 - 2. Full size sample of clip and batten.
 - 3. Samples showing manufacturer's full range of colors.
Submit additional or larger samples of selected colors upon request.
- C. Shop Drawings:
 - 1. Detailed drawings showing layout of panels, anchoring details, joint details, trim, flashing, and accessories.
 - 2. Show details of weatherproofing, terminations and penetrations of metal work.
 - 3. Show methods of installation and anchorage to accommodate thermal movement.
- D. Warranty:
 - 1. Submit copy of manufacturer's warranty.
 - 2. Submit additional warranties as required by this Section.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver roof materials to site until ready for installation. Comply with manufacturer's recommendations for handling storage and protection during installation.

1.05 WARRANTY

- A. Provide manufacturer's one year guarantee against defects in materials and workmanship, as delivered.

- B. Provide installers, separate two-year guarantee against defects in installed materials and workmanship, including water integrity. Guarantee shall begin with the date of Substantial Completion.
- C. Provide written warranty, signed by manufacturer stating painted wall panel finish will not check, flake, peel or chip for a period of fifteen (15) years, minimum.
 - 1. Film will not fade, peel or crack, ASTM D-1737.
 - 2. Abrasion resistance: will withstand 30 liters of falling sand before appearance of base metal, ASTM D-968.
 - 3. No checking, blistering or adhesion loss when tested for 5000 hours per ASTM G-23-69.
 - 4. Hardness: F-2H per ASTM D-3363.
 - 5. Humidity: less than 5% #8 blisters when tested for 1000 hours per ASTM D-2247 (100% humidity at 100°F).
 - 6. Salt-spray: maximum 3/16" creep and less than 5 #6 blisters when tested for 1000 hours per ASTM - B117 (5% salt fog at 95°F).
- D. Provide written warranty, signed by manufacturer stated painted finish will not chalk or fade for a period of ten (10) years, minimum.
 - 1. Maximum chalk rating of 6 as measured by ASTM D659-44.
 - 2. Finish will not change color more than 1 degree in excess of 6 NBS units as measured by ASTM D-2244.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Metal Wall Panel (Concealed Fasteners - Flush):
 - 1. Provide one of the following approved products:
 - a. "Metal Sales Manufacturing Corp.", Flush Face Series-12; #TLC-2.
 - b. "Fabral Metal Wall and Roof Systems", Architectural Commercial Siding; Select Series 12-R2.
 - c. "Metecno-Morin", Concealed Fastener Panels; #F-12-2.
 - d. "Centria", IW Series, #11-A.
 - e. "Firestone Building Products Company"; UNA-CLAD UC-500.
 - f. "MBCI", Artisan Series #L12.
 - 2. Panels:
 - a. Roll formed G-90 galvanized steel.
 - b. 12" panel width coverage.
 - c. Concealed fastened panel.
 - 3. Profile:
 - a. 1" to 1-1/2" nominal panel height.
 - b. Flush face solid surface.
 - c. Two indented pencil ribs equally spaced in the width of the panel face.
 - 4. Fasteners:
 - a. Direct fastening through fastening leg at end of panel.
 - b. Screws into structure to be #10-16x1" pancake head driller screws.
 - c. Fasten per manufacturer's recommendation or at 48" o.c., minimum.
 - d. Adjacent panel installed in tongue-and-groove type fashion to cover and conceal fastener.

- B. Metal Wall Panel (Exposed Fasteners - Ribbed):
1. Provide one of the following approved products:
 - a. "Metal Sales", 7/8" Corrugated Wall
 2. Panels:
 - a. Roll formed G-90 galvanized steel.
 - b. 24 gauge (.91mm)
 - c. Direct fastened exposed panel.
 3. Panel Depth: 7/8" rib height.
 4. Panel Width: 34-2/3"
 4. Fasteners:
 - a. Direct fastening through panel.
 - b. Screws into structure to be prefinished steel sheet metal screws with a neoprene washer.
 - c. Fasten per manufacturer's recommendation or at 48" o.c., minimum.
 - d. #14 size, minimum.
 - e. Fastener color to match panel color.
- C. Finish:
1. Exposed side: Kynar 500 (PVDF).
 2. Back side: Acrylic wash coat, 0.3 - 0.4 mil dry film thickness.
 3. To be selected from manufacturer's entire selection, including premium colors.
- D. Flashing and Trim:
1. Material:
 - a. C-90 galvanized steel.
 - b. Minimum 26 gauge.
 2. Finish:
 - a. Kynar 500 (PVDF).
 - b. Color to match wall panel.
 3. Anchors:
 - a. Stainless steel.
 - b. Other nonferrous or coated galvanically compatible material as recommended by the metal wall panel manufacturer and as approved by the Architect.
 4. Expansion and Control Joints:
 - a. As recommended by metal wall panel manufacturer.
 5. Length:
 - a. Provide lengths as indicated on the Drawings.
 - b. If not indicated, provide minimum 10'-0" length with 6" splice plate to allow thermal movements.
- E. Foam Closure:
1. Black closed cell foam meeting ASTM D1056. Closures to be supported and protected from weathering by a metal channel matching the flashing.
 2. Provide tape and sealants with an indicated service life of 20 years.
 3. Provide closures and pan-ends of panels at all exposed ends and corner conditions.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine conditions under which metal panels are to be installed.
Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install flush metal panel system horizontal on fascia, parallel to wall on soffit, in accordance with manufacturer's instructions.
- B. Install ribbed panel horizontal on sliding doors and one metal studs in Rooms 101 and 109, in accordance with manufacturer's instructions.
- C. System shall be capable of accommodating out-of-square and out-of-plumb conditions normally encountered in building construction.
- D. Remove stripable, protective vinyl film immediately after installation.

SUBMITTAL CHECK LIST

- 1. Manufacturer's Literature.
- 2. Samples.
- 3. Shop Drawings.
- 4. Warranty.

END OF SECTION 07410

SECTION 07531 - ELASTOMERIC SHEET ROOFING SYSTEM - FULLY ADHERED (EPDM)

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, supervision and services required to complete the Work indicated, noted and detailed on the Drawings and specified herein.
- B. The Work generally involves a new single-ply E.P.D.M. (Ethylene Propylene Diene Monomer) membrane roofing system. In general, and not by way of limitation, work includes, but is not limited to, the following:
 - 1. E.P.D.M. system at low slope roofs:
 - a. Insulation (polyisocyanurate insulation boards) mechanically fastened to the deck, with tapered insulation saddles mechanically fastened to the deck.
 - b. Overlayment board atop the insulation, mechanically fastened to the deck. Joints of overlayment staggered with insulation joints.
 - c. The membrane sheet is fully adhered to the overlayment board, and the seams are glued, lapped and sealed.
 - d. Work includes the installation of new insulation, saddles, blocking, roof membrane, fasteners, adhesives, copings, flashings, sealants, and any/all additional items, components and accessories necessary to complete the work as indicated and meet the manufacturer's warranty requirements for a complete system warranty.
- C. The words "ply", "membrane", and "sheet" are used interchangeably, and are to be interpreted as having the same meaning.
- D. Work includes the following special warranties, as specified:
 - 1. Water-tightness warranty from the installer.
 - 2. Warranty from the manufacturer for water-tightness.
- E. Not all details and conditions are shown on the Drawings. Contractor is responsible for providing a complete, finished, and water-tight roof system, warranted for water tightness from the deck up.
- F. System requirements or details as indicated on the Drawings or specified herein may exceed the manufacturer's minimum warranty requirements. Provide as indicated, above and beyond the minimum warranty requirements. Notify the Architect during bidding if any conflicts exist between that as indicated and the manufacturer's warranty requirements.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Related Documents:
 - 1. The Contract Documents, as defined in the Summary of Work, apply to the Work of this Section.
 - 2. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- B. Related Sections:
 - 1. Section 06100 - Rough Carpentry
 - 2. Section 07600 - Flashing, Sheet Metal and Roof Accessories
 - 3. Section 07900 - Joint Sealers
 - 4. Division 15 - Mechanical and Plumbing Work
 - 5. Division 16 - Electrical Work

1.03 QUALITY ASSURANCE

- A. Elastomeric sheet roofing and flashing shall be installed only by factory-trained and manufacturer approved and licensed roofing contractors familiar with the product and in strict accordance with the manufacturer's instructions.
- B. All details relating to the installation of the approved roofing contractor and/or by the manufacturer shall be installed in such a manner that the manufacturer will furnish the specified Warranty for the installation.
- C. All materials used shall be as furnished or approved by the roofing manufacturer for use and compatibility with the entire roofing system.
- D. Manufacturer shall send a qualified technical representative to project site for purpose of advising Installer of procedures and precautions related to use of roofing materials.
- E. UL Listing: Provide labeled materials that have been tested and listed UL for application indicated to provide a "Class A" rated materials/system.
- F. Factory Mutual Listing: provide flexible sheet roofing system which is listed as approved in the FM Approval Guide and complies with the following FM classifications:
 - 1. "Class 1" fire rating.
 - 2. "Classification I-90" wind uplift rating on FM Loss Prevention Data Sheets 1-28 and 1-29, for 90 mph 3-second gust, Exposure Category C.
- G. Conduct fastener pullout tests in accordance with the latest revision of the SPRI/ANSI Fastener Pullout Standard to help verify condition of deck/substrate and to confirm expected pullout values.

1.04 REFERENCES

- A. Publications of the following institutes, associations, societies and agencies are referred to in this Section.
 - 1. American Society for Testing and Materials (ASTM):
 - a. C 208 - Specification for Cellulosic Fiber Insulating Board.
 - b. C 1177 - Standard Specification for Glass Mat Gypsum Roof Board.
 - c. C 1289 - Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
 - d. D 412 Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.
 - e. D 471 Test Method for Rubber Property-Effect of Liquids.
 - f. D 573 Test Method for Rubber-Deterioration in an Air Oven.
 - g. D 624 Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
 - h. D 1149 Test Method for Rubber Deterioration-Surface Ozone Cracking in a Chamber.
 - i. D 1822 Test Method for Tensile-Impact Energy To Break Plastics and Electrical Insulating Materials.
 - j. D 2137 Test Methods for Rubber Property-Brittleness Point of Flexible Polymers and Coated Fabrics.
 - k. D 5602 - Test Method for Static Puncture Resistance of Roofing Membrane Samples.
 - l. D 5635 - Test Method for Dynamic Puncture Resistance of Roofing Membrane Samples.
 - m. E 84 – Test Method for Surface Burning Characteristics of Building Materials.
 - n. E 96 – Test Methods for Water Vapor Transmission of Materials.
 - o. E 108 – Test Methods for Fire Tests of Roof Coverings.

- p. G 26 - Practice for Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials.
- q. G 53 - Practice for Operating Light and Water Exposure Apparatus (Fluorescent UV/Condensation Type) for Exposure of Nonmetallic Materials.
- r. G 155 Practice for Operating Light Exposure Apparatus (Xenon-arc Type) With and Without Water for Exposure of Non-Metallic Materials.
- s. G 154 Practice for Operating Light and Water-Exposure Apparatus (Fluorescent UV Condensation Type) for Exposure of Nonmetallic Materials.
2. Underwriter's Laboratories, Inc. (UL) – Class rating per applicable State Building Code.
3. Factory Mutual Underwriters (FM):
 - a. Factory Mutual Research Corporation-Loss Prevention Data Sheets: 1-7; 1-28; 1-28(s); 1-29; 1-30; 1-49.
 - b. Factory Mutual Research Corporation (FMRC) - Approval Guide - Roof Coverings.
 - c. Factory Mutual Research Corporation Standard 4470 - Approval Standard for Class I Roof.
4. National Roofing Contractors Association (NRCA) - NRCA Roofing and Waterproofing Manual.
5. Roof Consultants Institute (RCI) - Glossary of Terms.
6. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal Manual.
7. American Society of Civil Engineers (ASCE) - Reference Documents ASCE 7-98, Minimum Design loads for Buildings and Other Structures.

1.05 CODE AND TEST REQUIREMENTS

- A. The roof system that is bid shall have been tested in compliance with the following codes and test requirements.
 1. The roof system assembly shall have test data in compliance with test criteria set forth in Factory Mutual Test Standard 4470 to support uplift pressure resistance to design pressures calculated in compliance with ASCE 7-98.
 2. The roof system assembly shall be approved for application within the International Building Code jurisdiction.
 3. The roof system assembly shall be installed in compliance with all local building and safety requirements adopted by the local building code jurisdiction.
 4. All metal flashings shall be in compliance with recommendations set forth in Factory Mutual Research Corporation Loss Prevention Sheet 1-49.

1.06 SUBMITTALS

- A. Submit the following in compliance with contract conditions and Division 1 Specification Sections.
 1. Compliance Confirmation:
 - a. Confirmation of Manufacturer and Applicator/Contractor/Installer requirements enumerated in this Section and as indicated on the Drawings.
 2. Samples:
 - a. 12" x 12" square sample of each type of membrane, including a finished "T-shaped" side/end-lap seam.
 - b. 12" x 12" square sample of all roof insulation types and overlayment used.
 - c. Flashing materials.
 - d. All fastener types used.
 3. Product Data:
 - a. Manufacturer's current published installation instructions, flashing and roofing specifications, Product Data Sheets for all products, and Material Safety Data Sheets for all products used in the assembly of the roof system.
 - b. Manufacturer's complete recommended maintenance procedures for roofing system, including precautions and warnings to prevent damage to, and deterioration of roofing system, and any safety precautions published by the roof system manufacturer.

4. Shop Drawings:
 - a. Provide complete installation details of roofing, flashing, fastening and insulation, including notation of roof slopes and fastening patterns of insulation and membrane. Shop drawings to include (but not limited to):
 - 1) Outline of roof with roof size and elevations shown.
 - 2) Profile details of flashing methods for all conditions and penetrations.
 - 3) Technical acceptance from roof membrane manufacturer.
 - 4) Insulation fastener layouts complying with FM Data Sheet 1-29. Indicate number of fasteners required for field, perimeter and corners.
 - 5) Setting plan for insulation including all tapered, saddles and crickets.
 - 6) Layout of roofing seams, direction of laps.
5. Certificates:
 - a. Manufacturer's written approval of:
 - 1) The roof system to be applied over the submitted insulation and deck type.
 - 2) The coping system.
 - 2) The Contract Documents.
 - 3) The Applicator/Contractor/Installer.
 - 4) Warranty conditions specified.
Submit certification letter acknowledging receipt of the specifications, intent to issue warranty, and intent to perform specified field inspections.
 - b. Insulation manufacturer's certification that the product is compatible with the proposed roof system and meets specification requirements.
 - c. Manufacturer's field reports from field inspections.
Submit the following reports directly to the Architect:
 - 1) Preparatory Inspection.
 - 2) Initial Inspection.
 - 3) Follow-up Inspections.
 - 4) Final Inspection.
 - d. At completion of roof application, the contractor and membrane manufacturer shall supply the Owner and/or Architect with a complete set of as-built drawings.
 - e. Certification from the membrane manufacturer at job completion confirming the installed roof assembly is in compliance with the approved submittals.

1.07 QUALIFICATIONS

- A. Applicator's Qualifications:
 1. **All roofing contractors/installers must be pre-qualified to bid, by both the manufacturer and the Architect, at least seven days prior to the bid date.**
 2. For purposes of quality assurance and performance with specified roof system installation, all bidders are to be approved by the manufacturer, and listed as approved by the Architect, prior to the bid date and throughout the installation, and able to present a copy of current certification status upon request by the Architect or Owner.
 3. Contractor must have experience in installing the specified roof system and be able to produce a list of referenced projects to visit.
 4. Maintain a full-time supervisor/foreman experienced with the specified roof system on-site when roof system application is in progress. Certification of general experience and experience with specified roof system shall be included in the submittal.
 5. Be equipped with a trained crew and all capital equipment required to perform work of this section.
 - a. Maintain all equipment and tools in good working order.
 - b. Provide, in writing, safety plan and equipment to the work force and specify, proper clothing.
 6. Contractors not already pre-qualified in this Specification, and wishing approval to be qualified to bid, shall submit qualifications and certifications in writing to the Architect for written approval prior to bid.

B. Pre-Qualified Installers:

1. **American Roofing**
4610 Roofing Rd.; Louisville, KY 40218
(502) 966-2900; (502) 966-2970 fax
2. **B&L Sheet Metal & Roofing**
1301 North Monroe Street; Bloomington, IN 47404
(812) 332-4309; (812) 332-8124 fax
3. **Blackmore and Buckner Roofing**
1256 East Roosevelt Avenue, Indianapolis, IN 46202
(317) 263-0707; (317) 263-0727 fax
4. **C.E. Reeve Roofing, LLC**
805 City Center Drive, Suite 160
Carmel, IN 46032
(317) 884-7663 (317) 846-8464 fax
5. **D. Riney Roofing, LLC**
2203 Stannye Drive; Louisville, KY 40222
(502) 544-6202
6. **Hedinger Roofing**
2803 Market Street; Jasper, IN 47546
(812) 482-5066; (812) 634-2123 fax
7. **Henry C. Smither Roofing**
6850 E. 32nd Street; Indianapolis, IN 46226
(317) 545-1304; (317) 546-4764 fax
8. **Horning Roofing and Sheet Metal Company**
2340 Enterprise Park Place Avenue; Indianapolis, IN 46218
(317) 636-9128; (317) 636-9134 fax
9. **HRC Roofing & Sheet Metal**
2845 Roadway Drive; Columbus, IN 47202
(812) 372-8409; (812) 372-6836 fax
10. **Palmer Roofing and Sheet Metal, Inc.**
1080 Jean Drive; Jeffersonville, IN 47130
(812) 283-4800; (812) 283-4900 fax
18. **R. Adams Roofing**
4990 Massachusetts Ave.; Indianapolis, IN 46218
(317) 545-7663
11. **Roofing Services and Solutions, LLC (RSS)**
1508 Fabricon Boulevard; Jeffersonville, IN 47130
(812) 283-4490; (812) 283-6412 fax
12. **Royalty Companies**
1000 D Avenue; Seymour, IN 47274
(812) 523-8392
13. **Southern Roofing, Inc.**
770 Jonesville Road; Columbus, IN 47201
(812) 375-1888; (812) 375-1850 fax
14. **South Central Roofing, Inc.**
1650 N State Rd 46; Columbus, IN 47203
(812) 579-5733; (812) 579-5739 fax

C. Manufacturer's Qualifications:

1. Must have a minimum of 20-year experience manufacturing elastomeric roofing membranes.
2. Provide a factory-trained technician to attend site meetings, interim inspections, and to perform final inspections of the roofing system.

3. Provide a warranty upon satisfactory installation of the roofing system.

1.08 PRE-INSTALLATION CONFERENCE

- A. Convene less than five days prior to commencing work of this section at the jobsite, and at a time to be determined by the architect, contractor, manufacturer's field representative, and the owner.
 1. All parties responsible for work of this section are required to attend including the Architect, Contractor and any other trades involved in the roofing work.
 2. Review installation procedures and coordination required with related work.
 - a. Tour, inspect and discuss condition of substrate, roof drains, roof drain final locations, curbs, penetrations and other preparatory work performed by other trades.
 - b. Review structural loading limitations of deck and inspect deck for loss of flatness and for required mechanical fastening.
 - c. Review roofing system requirements (Drawings, Specifications, Submittals and any other Contract Documents.)
 - d. Review required submittals, both completed and yet to be completed.
 - e. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
 - f. Review requirements for Manufacturer's Roofing Quality Control Inspector inspections, other inspections, testing, certifying, and material usage accounting procedures.
 - g. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions, including possibility of temporary roofing.
 3. Inspect and make notes of job conditions prior to installation.
 - a. Minutes shall be taken at the conference and provided to all parties present.
 - b. All outstanding issues shall be noted in writing designating the responsible party for follow-up action and the timetable for completion.
 - c. Application of roofing system will not take place until all outstanding issues are completed.
 - d. Acceptable staging areas; suitable parking and access points; placement of trash conveyances; sanitary requirements; and all working hour restrictions (day/night, weekends, holidays); noise restrictions and project complaint procedure between contractor and building owner (occupants).
 4. If conditions are not satisfactory, and an additional conference is required, Contractor shall bear the transportation expenses for all parties to attend second conference.

1.09 DELIVERY, STORAGE AND HANDLING

- A. Arrange deliveries to provide sufficient quantities to permit continuity of any phase of work.
- B. Do not store material on roof construction in concentrations large enough to impose excessive stress on decking or structural members. No stockpiling of materials on the roofs will be permitted. Materials will be raised onto roof in limited quantities only as needed for immediate work.
- C. Membrane shall be stacked and protected from moisture penetrating the ends.
- D. Deliver all materials and store in their unopened original packaging, bearing and manufacturer's name, related standards and any other specification or reference accepted as standard.
 1. When stored outdoors, insulation is to be stacked on pallets or dunnage at least four (4) inches above ground level and covered with "non-sweating" tarpaulins. Factory shrink wrapping is not sufficient protection for insulation – regardless of the number of layers of shrink wrapping.
 2. Store membrane rolls lying down on pallets and fully protected from the weather with clean canvas tarpaulins. Unvented polyethelene tarpaulins are not acceptable due to the accumulation of moisture beneath the tarpaulin in certain weather conditions that may affect the ease of membrane weldability.

- E. Protect and permanently store all materials in a dry, well-vented and weatherproof location. Only materials to be used the same day shall be removed from this location. During winter, store materials in a heated location with a 50°F. minimum temperature, removed only as needed for immediate use. Keep materials away from open flame or welding sparks.
- F. Carefully store on end materials delivered in rolls with salvage edges up, a minimum of 6 inches above grade. Store metal flashings and counterflashings in such a way as to prevent wrinkling, twisting, scratching and other damage.
- G. Adhesive storage must be between the range of above 40°F and below 80°F. Area of storage shall be suitable for flammable storage.
- H. All materials determined to be damaged (as determined by the Architect or manufacturer's representative) shall be removed from job site and replaced at no cost to Owner. Any insulation which becomes wet must be removed from the jobsite. Any insulation which experiences condensation under the factory shrink wrapping must be removed from the jobsite.

1.10 MANUFACTURER CERTIFICATIONS AND INSPECTIONS

- A. Manufacturer Certification:
 - 1. Submit certification by the manufacturer of the system materials used that these Specifications and the Drawing Details are acceptable to them for the deck and surfacing to which they are to be applied.
 - 2. If details for any manufacturer's systems proposed in the Contract Documents are not acceptable to the manufacturer, submit corresponding details proposed for the particular application, together with the manufacturer's reasons for not accepting the conditions depicted in the Specifications or Drawings. No alternate details will be considered without evidence of valid objections on the part of the manufacturer to the Contract requirements prior to bid due date.
 - 3. No deviation is to be made from this Specification without prior written approval by the manufacturer and the Architect.
 - 4. Submit certification signed by membrane manufacturer's quality control manager that polymer thickness is as specified.
- B. Inspection:
 - 1. Prior to completion, at least twice during installation, and at completion of the installation, an inspection shall be made by a representative of the manufacturer in order to ascertain that the roofing system has been installed according to their published specifications, standards and details.
 - 2. Warranty will be issued upon approval of the installation.
 - 3. Copies of manufacturer's inspection reports shall be submitted directly to the Architect, and to the Owner within ten days of the inspection.
 - 4. Perform additional inspections at no additional cost, as required to accommodate phasing of the work, partial installations, and as otherwise requested by the Architect to address quality control issues.

1.11 WARRANTY

- A. Upon completion of work, furnish to the Owner the manufacturer's written and signed standard warranty, certifying the performance of his products and the consistency of the properties of such products affecting their performance for a period of **20 years** from date of acceptance.
- B. The Contractor is to cover damages to the building resulting from failure to prevent penetration of water during construction.

- C. The Contractor is to guarantee all work against defects in materials and workmanship for a period of one year following final acceptance of the Work.
- D. **Warranty shall be a No-Dollar-Limit (NDL) total system warranty** covering the materials and labor for complete roof system. The Warranty shall not be pro-rated over the term of the warranty and shall not be limited to the original installation cost. Roof system is defined as insulation, overlayment, roof membrane, flashings, coping, counter flashing, termination bars, boots, penetrations, primer, scuppers, roof drain pans, crickets, saddles, fasteners, and all other roofing components needed to create a water tight barrier above the metal deck.
- E. Include the following items within the Warranty:
 - 1. Roofing inspection by Manufacturer's Roofing Quality Control Inspector within 24 months after date of Final Acceptance.
 - 2. Roofing manufacturer will provide unlimited repairs during warranty period with no cost limit.
 - 3. Temporary emergency repairs may be made by Owner without voiding any warranty provisions.
 - 4. Attach copy of Record Document Roof Plan Drawings, Roof Detail Drawings, and Record Membrane Roofing Specification Section to Warranty.
 - 5. Warranty shall cover wind gusts up to 72 miles per hour (sustained), and 90 mph-3 second gust.
 - 6. Colorfastness: no significant change in the color of the membrane during the Warranty period.
 - 7. Warranty shall not exclude "ponding" water, as defined in the NRCA Roofing Guidelines.

1.12 JOB CONDITIONS

- A. Proceed with roofing work when existing and forecasted weather conditions permit work to be performed in accordance with manufacturer's recommendations and warranty requirements. All surfaces to receive insulation, membrane or flashings must be dry.
- B. During roofing work, exposed unfinished surfaces shall be protected with tarps in order to prevent damage. Contractor shall assume full responsibility for any damage. Protect existing building and completed areas of new additions from all risks of damage from inclement weather.
- C. Do not install membrane under the following conditions:
 - 1. The roof assembly permits interior air to pressurize the membrane underside.
 - 2. Any exterior wall has 10% or more of the surface area comprised of open doors or windows or unfinished wall enclosures.
 - 3. The wall/deck intersection permits air entry into the wall flashing area.
- D. Install uninterrupted waterstops at the end of each day's work and completely remove waterstops before proceeding with next day's work. Waterstops shall not emit dangerous or unsafe fumes and shall not remain in contact with the finished roof as installation progresses. Replace contaminated membranes at no cost to Owner.
- E. Do not use asphalt, coal tar, heavy oils, roofing cement, creosote or preservatives.
- F. Arrange work sequence to avoid using newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is unavoidable, provide all necessary protection and barriers to segregate work area to prevent damage to adjacent areas and provide plywood protection boards.
- G. Remove all dirt, debris, and dust from all surfaces prior to and during application.

- H. Comply with all safety regulations of authorities having jurisdiction.
- I. All material removed during construction and all waste materials to be immediately removed and legally disposed of off site.
- J. Do not overload the roof deck or building structure.
- K. Keep all solvents, flammable adhesives and deck primers away from open flames, sparks and excessive heat. Keep lids closed at all times on all unused cans. Keep solvents adhesives and primers away from air intake vents. Prevent adhesive odors from entering building.
- L. Verify that all roof drain lines are functioning correctly before beginning work. Report any blockages to Architect.
- M. Repair all damage to existing building and grounds caused by construction work at no cost to Owner.
- N. Wear proper clothing and protective gear at all times, for protection of both the installers and the roof system surfaces, materials and components.
- O. Protect new roof membrane from any asphalt and coal tar residue elsewhere on the project. This residue, whether tracked by foot traffic or in the form of construction dust is detrimental to the new roof membrane. Permanent walk pads are to be placed around roof hatches leading to roof access ladders. Inform any/all other trades accessing or working on the roof of this concern.
- P. Visit the site prior to bidding and carefully examine all existing areas and conditions that may affect proper execution of the work. No claims for extra costs will be allowed because of lack of full knowledge of the existing conditions.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide one of the following approved EPDM Roofing Systems (BLACK EPDM):
 - 1. "Firestone Building Products"; RubberGard.
 - 2. "Carlisle"; Sure-Seal.
 - 3. "Versico Roofing Systems"; VersiGard.

2.02 ROOF SYSTEM

- A. Adhered Elastomeric Membrane Roofing Sheet:
 - 1. E.P.D.M. (Ethylene Propylene Diene Monomer) compounded elastomer conforming to the latest minimum physical properties of the manufacturer.
 - 2. Minimum thickness: .060 inches.
 - 3. Minimum tensile strength: 1,300 psi (ASTM D 412).
 - 4. Elongation: 250% min. (ASTM D 412).
 - 5. Vapor permeable.
 - 6. Ultraviolet and ozone resistant.
 - 7. Low temperature brittleness of -40°F min. (ASTM D 2137).
 - 8. Sheets shall be as large as possible to minimize seams.

- B. Flashing:
 - 1. Self curing E.P.D.M. flashing.
 - 2. Minimum thickness: .060 inches.
 - 3. Minimum tensile strength: 1,300 psi (ASTM D 412).
 - 4. Elongation: 300% min. (ASTM D 412).
 - 5. Ultraviolet and ozone resistant.
 - 6. Low temperature brittleness of -40°F min. (ASTM D 2137).
 - 7. Color to match sheet membrane.
- C. Bonding Adhesive:
 - 1. Compatible with materials to which membrane is to be bonded and recommended by membrane manufacturer.
 - 2. Formulated to withstand minimum 90 psf uplift force.
- D. Sheet Seaming System:
 - 1. Manufacturer's standard materials for sealing lapped joints, including edge sealer to cover exposed spliced edges as recommended by membrane manufacturer.
- E. Termination Bars, Cant Strips and Flashing Accessories:
 - 1. Types recommended by membrane manufacturer provided at locations indicated and at locations recommended by the manufacturer, and including adhesive tapes, flashing cements, and sealants.
- F. Coping:
 - 1. Provide products from one of the following approved manufacturers:
 - a. "Metal-Era".
 - b. "Hickman".
 - c. "Architectural Products Company".
 - 2. Unless otherwise indicated, type to be as recommended by membrane manufacturer provided at locations indicated on the Drawings. Match size and profile as indicated on the Drawings.
 - 3. Fascia covers to be snap-on type, constructed of .040" minimum extruded aluminum, with Kynar 500 finish.
 - 4. Coping to have concealed splice plates and corrosion resistant fasteners.
 - 5. No exposed fasteners permitted.
 - 6. Color as selected by Architect from manufacturer's entire offering.
- G. Overnite tie-in sealants as recommended by manufacturer, but in no instance is hot asphalt permitted.

2.03 FASTENERS

- A. Fastening systems shall use fasteners approved for use by the membrane manufacturer, designed metal and wood decks, and for adhesion of flashing to the substrates encountered.
- B. Insulation and Overlayment:
 - 1. Mechanical fasteners with fastener plates to secure insulation to decking shall be approved by the insulation manufacturer for the system specified.
 - 2. The same brand fastener is to be used throughout the work.
 - 3. Number of fasteners and layout will be recommended by the manufacturer and as per FM Approval Guide for I-90 wind uplift. Install additional fasteners as directed in the field by the Architect.
 - 4. Length of fastener shall be determined by the thickness of the decking and may vary with the thickness of the insulation. Fasteners shall be appropriate lengths to achieve a minimum of 1 inch penetration.

5. The fastener and plate shall be used in all areas for attachment of the membrane. The length of the fastener shall be determined by the thickness of the insulation allowing for a 1 inch penetration into the deck, or as otherwise determined by the membrane manufacturer, but not less than 1 inch.

2.04 WOOD BLOCKING AND SHEATHING

- A. All nailers and blocking material to be free of wane, shake, decay or checks.
 1. Blocking shall not be less than Construction Grade, Southern Pine, max. 19% moisture content.
 2. Provide manufacturer's recommended protection between blocking for equipment, piping, and conduit supports above roof. Provide solid wood blocking as required for fastening and terminating membrane and flashing system. Install at the perimeter of the entire roof and around other roof projections and penetrations. Thickness of nailers must match the insulation thickness to achieve smooth transition.
 3. See Section 06100 - Rough Carpentry for further requirements of blocking with regards to Preservative Treated Wood and Fasteners in Treated Wood.
- B. Plywood to be minimum 1/2 inch thick CDX (C side out), smooth surfaced, exterior grade, with exterior grade glues. Provide where indicated on Drawings. Whether indicated on Drawings or not, provide at all existing masonry and concrete walls where membrane is installed and at all other locations required by manufacturer, and no change in contract price. Prime all plywood prior to membrane installation.

2.05 ROOF INSULATION

- A. Provide one of the following approved products:
 1. "Firestone"; ISO 95+ Polyisocyanurate Insulation.
 2. "GenFlex"; ISO.
 3. "Versico Incorporated"; MP-H POLYISO.
- B. Polyisocyanurate Board Insulation:
 1. Reference Standards:
 - a. FS HH-I-1972/Gen.
 - b. FS HH-I-1972/2.
 - c. FS HH-I-1973/3.
 - d. ASTM C 209 – Water Absorption.
 - e. ASTM E 96 - Water Vapor Transmission of Materials.
 - f. ASTM D 1621 – Compressive Strength.
 - g. ASTM D 1622 – Density.
 - h. ASTM D 2126 – Dimensional Stability.
 - i. ASTM E 84 – Flame Spread.
 2. Quality Control:
 - a. Verify insulation furnished is compatible with and suitable for the specified roofing system, including roofing conditions, installation procedures and type of membrane to be used.
 3. Description:
 - a. Rigid cellular thermal insulation with glass-fiber reinforced polyisocyanurate closed-cell foam core and asphalt/glass fiber felt facing laminated to both sides.
 - b. Complying with Federal Specification HH-I-1972/2.
 - c. 20 psi minimum.
 - d. Aged R-value of 5.56 per inch, minimum, at 75°F respectively.
 - e. Nominal Size 48 inches x 48 inches.
 4. Thickness:
 - a. Thickness as indicated on the Drawings (not including tapered saddles and crickets). If not indicated, provide 5 inches total (with a minimum R-25).

5. Layers:
 - a. Unless indicated otherwise, insulation is to be installed in two layers.

C. Polyisocyanurate Tapered Insulation:

1. Quality Control:
 - a. Meet all Reference Standards for Polyisocyanurate Board Insulation as specified herein.
 - b. Meet or exceed all UL and FM test requirements and roof membrane manufacturer's requirements for installation and warranty.
 - c. Contact the manufacturer's representative for any tapered design assistance.
2. Description:
 - a. Same materials as Polyisocyanurate Board Insulation specified herein, but manufactured in a tapered profile.
 - b. Provide tapered insulation, saddles and crickets atop board insulation as indicated on the Drawings and/or specified herein.
3. Thickness and Slope:
 - a. Tapered Insulation:
 - 1) Tapered insulation areas to be provided in thickness and slope indicated (not including tapered saddles and crickets), or if not indicated, minimum 1/4 inch per foot slope.
 - b. Saddles and Crickets:
 - 1) Slope as required to direct water away from the item the saddle or cricket is protecting, minimum 1/4 inch per foot slope.

D. Mechanical Anchors:

1. Reference Standards:
 - a. SAE 1022, Heat Treated.
2. Type:
 - a. As recommended by insulation manufacturer for deck type, and complying with fire and insurance requirements.
 - b. Fastener plates are to be a flat profile to minimize telegraphing through membrane at steep slope roof.
3. Description:
 - a. Heavy-duty threaded fastener with 3-coat waterborne fluorocarbon polymer coating and drill point tip capable of penetrating 20-gauge steel.
 - b. Fastener shall meet minimum thread size of .260 inches and 13 threads per inch.
 - c. Length shall be sufficient to penetrate deck a minimum of 3/4 inch for steel and 1 inch for wood and concrete.
 - d. Structural concrete decks must be pre-drilled with a 7/32 inch carbide drill bit to a depth 1/2 inch deeper than the fastener engagement.

E. Adhesive Anchoring:

1. Where required, use high velocity insulation adhesive as recommended by membrane manufacturer and meeting FM 1-90.

2.06 OVERLAYMENT BOARD

A. Provide one of the following products, pending compliance with the manufacturer's warranty:

1. "Georgia Pacific", "Dens Deck"(siliconized gypsum).
2. "Firestone", "Coverdeck 250" (siliconized gypsum).
3. "Firestone", "IsoGard HD Coverboard" (polyisocyanurate).

B. Description of Acceptable Types:

1. Siliconized gypsum, fire tested hardboard with heat cured glass-mat facers; 1/4" thick.
2. High-density, closed-cell polyisocyanurate foam core with a coated glass facing sheet; 1/2" thick.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Before commencing work, the Owner's representative, together with the roofing contractor and manufacturer field supervisor shall inspect and approve the deck condition (slopes and nailing supports if applicable) as well as verticals on parapet walls, roof drains, stack vents, vent outlets and others, building joints, etc. If applicable, a non-compliance notice shall be submitted to the contractor so that adjustments can be made. Commencement of work shall imply acceptance of surfaces and conditions, and responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.
- B. Any standing water or snow shall be completely removed from the area prior to starting roof work.
- C. Before commencing work, all surfaces shall be smooth, clean, dry and free of any debris that would adversely effect the installation of the membrane.
- D. All roof penetrations shall be made prior to installation of the roofing membrane. Verify that the work of other trades has been properly completed.
- E. Prevent compounds from entering and clogging drains and conductors, and from spilling or migrating onto surfaces or other work.
- F. Environmental Requirements:
 - 1. Do not work in rain, snow, or in presence of water.
 - 2. Roofing installation may continue in cold weather provided adhesives and sealants are stored at room temperature and used within a 4 hour period after being exposed to lower temperatures.
 - 3. Remove any work exposed to freezing.
- G. All surface voids of the immediate substrate greater than 1/4 inch wide must be properly filled with an acceptable insulation or suitable fill material.
- H. Protect metal, glass, plastic, and painted surfaces from adhesives and sealants.
- I. Protect neighboring work, property, cars, and persons from spills and overspray from adhesives, sealants and coatings and from damage related to roofing work.
- J. Protect finished areas of the roofing system from roofing related work traffic and traffic by other trades.

3.02 SURFACE PREPARATION

- A. Clean all debris.
- B. Replace damaged or defective areas prior to commencement of work under this Section.
- C. Protect adjacent building surfaces and equipment from damage.
- D. Maintain all equipment and tools in good working order.

3.03 INSULATION APPLICATION

- A. Install roof insulation with overlayment, with joints staggered. Install and fasten at a rate to meet specified uplift requirements. Fasteners must meet an average pullout of 300 lbs. No gaps between boards, nailers and penetrations greater than 1/8 inch permitted.
- B. Do not install insulation which has been allowed to become wet, or has had any contact with water. Remove all insulation which becomes wet. Remove broken, delaminated and damaged insulation.
- C. Install tapered insulation around all roof drains at least 3'-0" x 3'-0" wide, and not greater than 4'-0" x 4'-0" wide to create a drain sump. Do not use metal sump pans. If existing metal sump pans are encountered, remove and patch decking as required.
- D. Install insulation and overlayment board at all faces of all curbs. Coordinate with other trades as required. Verify that existing mechanical equipment will still fit over curb after installation of new insulation. Contact Architect for instruction if it appears that equipment will not fit.

3.04 FASTENING REQUIREMENTS - MECHANICALLY FASTENED INSULATION SYSTEM

- A. Design for Exposure Category C, 90 mph, 3 second gust. Provide calculations showing compliance with ASCE 7-98, SPRI, and FM requirements for wind uplift.
- B. Penetrations and Drains require the use of 3 head lap fasteners in field areas. Target must be installed around penetration/drain and fastened in all four directions within 3'-0" x 3'-0" area.
- C. Curbs are to be treated as perimeters for density protocol. Area must assume a minimum of a 3 foot dimension from edge of curb out onto the field areas.
- D. Insulation Attachment Top Layer:
 - 1. Full depth of all layers of approved rigid insulation and overlayment board.
 - 2. Top Layer Attachment: Mechanically Attached.

3.05 INSTALLATION

- A. All membrane installation is to be in strict accordance with the manufacturer's instructions. Install membrane by unrolling over prepared substrate, lapping adjoining sheets as recommended by manufacturer.
- B. For Adhered Membranes:
 - 1. Apply adhesive to surfaces to be bonded according to manufacturer's instructions.
 - 2. Use solvent based adhesive except where local ordinances prohibit use.
 - 3. Do not use solvents where fumes can migrate into existing or occupied portions of building. If occupants of the building or people nearby the project complain about solvent odor, discontinue use and use water based adhesive.
 - 4. Roll membrane into place when adhesive has properly cured.
- C. Sealing of Seams:
 - 1. Treat seams with special cement and apply sealant to exposed sheet edges, tapering application as recommended by the manufacturer.
 - 2. Check all sealed seams for continuity using a rounded screwdriver, or cotter pin puller type tool. Do not probe seams until they have cured and reached the ambient temperature. On-site evaluation of sealed seams to be made daily by the Contractor at locations as directed by the Architect, the Owner's Representative, or the membrane manufacturer.
 - 3. Roll all seams as the work progresses with silicone coated steel hand roller.

- D. Install mechanical fasteners, flashings and counter-flashings and accessories at locations shown on the Drawings and as recommended by the manufacturer.
1. Secure membrane at all locations where the membrane terminates or goes through an angle change greater than 1 inch in 12 inches, except for round pipe penetrations less than 18 inches in diameter and square penetrations less than 4 inch square.
 2. Use same membrane for flashing and field.
- E. Flashings:
1. Install all flashing concurrently with the roof membrane as the job progresses. Do not use temporary flashing unless approved in writing by Architect and membrane manufacturer. Remove and replace any materials that become wet as a result of improper or inadequate coverage of roof with membrane and permanent flashing.
 2. Adhere flashing in accordance with manufacturer's instructions, and paragraph above for adhered membranes.
 3. Install transition material at base of all transitions, peaks and valleys as required by manufacturer.
 4. Extend all flashing a minimum of 8 inches above roofing level, unless approved in writing by manufacturer and Architect.
 5. Mechanically fasten all flashing membranes along the counter flashed top edge. Provide termination bar, sealant, and counterflashing at all terminations.
 6. Install coping in accordance with manufacturer's instructions. Any cut edges of metal are to be neat, straight, and at right angles. Paint exposed metal at cut edges with paint to match factory finish.
- F. Flashing Penetrations:
1. General:
 - a. Flash all penetrations passing through the membrane.
 - b. The flashing seal must be made directly to the penetration.
 2. Pipes, Round Supports, etc.:
 - a. Flash with manufacturer's prefabricated, pre-molded Pipe Flashings where practical.
 - b. Flash using unsupported Flashing membrane when Pre-Molded Flashing is not practical.
 3. Structural Steel Tubing:
 - a. Use a field fabricated pipe-flashing detail provided that the minimum corner radius is greater than 1/4 inch and the longest side of the tube does not exceed 12 inches. When the tube exceeds 12 inches: use a standard curb detail
 4. Pipe Clusters and Unusual Shaped Penetrations:
 - a. Fabricate penetration pockets to allow a minimum clearance of 1" between the penetration and all sides.
 - b. Secure penetration pockets per manufacturer Details.
 - c. Fill penetration pockets with Pourable Sealer, so as to shed water.
 5. Hot Pipes:
 - a. Protect the roof membrane and components from direct contact with steam or heat sources when the in-service temperature is in excess of 140 degrees F. In all such cases flash to an intermediate insulated "cool" sleeve per manufacturer details.
 6. Flexible Penetrations:
 - a. Provide a weather tight gooseneck set in Water Block Seal and secured to the deck.
 - b. Flash in accordance with manufacturer Details.
 9. Expansion Joints:
 - a. Install as shown on roof drawings in accordance with manufacturer details.

3.06 WATER CUT-OFF

- A. At the end of the day's work, and when precipitation is eminent, a water cut-off shall be constructed at all open edges. Construct the cut-off with the same membrane that is used for the roofing system. Cut-off must be able to withstand extended periods of wet weather. The water cut-off shall be completely removed prior to resuming the installation of the roofing system. Hot asphalt cut-offs are not permitted.
- B. Remove all membrane and insulation damaged by waterstop installation, or infiltration of water around waterstop, prior to resuming work.
- C. If inclement weather occurs while a temporary waterstop is in place, monitor the situation as necessary to maintain a watertight condition.
- D. If any water is allowed to enter under the newly completed roofing, remove and replace the affected area and repair all damage at no additional cost to Owner.

3.07 CLEAN UP

- A. Clean up and remove daily from the site all wrappings, empty containers, paper, loose particles and other debris resulting from these operations. Do not allow any material into roof drains, gutters and downspouts.
- B. Remove markings from finished surfaces.
- C. Repair or replace defaced or disfigured finishes caused by work of this Section.

3.08 PROTECTION

- A. Provide traffic ways, erect barriers, fences, guards, rails, enclosures, chutes and the like to protect personnel, roofs, structures, vehicles and utilities.
- B. Plywood for traffic ways required for material movement over existing roofs shall be not less than 5/8 inch thick.

3.09 FIELD CONTROL

- A. Field inspection will be performed as outlined elsewhere in this Section, under Part 1 - Manufacturer Certifications and Inspections.
- B. Correct all punchlist items from Architect and Manufacturer's Field Representative prior to demobilization from the project.

SUBMITTAL CHECKLIST

- 1. Compliance Confirmation.
- 2. Samples.
- 3. Product Data.
- 4. Shop Drawings.
- 5. Certificates.
- 6. Warranty.

END OF SECTION 07531

SECTION 07600 - FLASHING, SHEET METAL AND ROOF ACCESSORIES

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The extent of each type of flashing and sheet metal work is indicated on the drawings and by provisions of this section.
- B. The types of work specified in this section include, but are not limited to, the following:
 - 1. Metal gutters.
 - 2. Metal downspouts.
 - 3. Miscellaneous sheet metal accessories.
- C. Gutters and downspouts may be either aluminum or galvanized steel as approved by the Architect. The intent is that all metal work shall have the same and consistent finish so as to appear as a cohesive installation. Coordinate with coping, fascia, soffits, flashings, trim, etc.

1.02 QUALITY ASSURANCE

- A. Sheet metal flashing and trim shall conform with recommended practices contained in "Architectural Sheet Metal Manual", Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).

1.03 SUBMITTALS

- A. Shop Drawings:
Show typical details of formed configuration, seams, joints, thicknesses, dimensions, fastening and anchoring methods.
- B. Samples:
 - 1. 6 inch x 6 inch piece of metal and each type fastener.
 - 2. Colors to be selected from manufacturer's entire standard selection.

1.04 JOB CONDITIONS

- A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Insure best possible weather resistance and durability of the work and protection of materials and finishes.
- B. Do not proceed with the installation of flashing and sheet metal work until curb and substrate construction, cant strips, blocking and other construction to receive the work is completed.

1.05 WARRANTY

- A. The Project warranty provided by the Contractor shall include agreeing to repair or replace sheet metal and flashing which has failed to fulfill performance requirements of waterproofing due to defective materials, workmanship or improper installation, during the warranty period.

1.06 FINISHES

- A. As shown on the Drawings or as selected from manufacturer's entire selection.
- B. All colors and finishes are to be as selected by Architect.
- C. Custom color may be required to produce a match to that selected or to match existing building materials.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Galvanized Steel:
 - 1. ASTM A 525, coating G90.
 - 2. Thickness (minimum):
 - a. 18 gauge.
 - b. 26 gauge flashing.
 - c. 24 gauge gutters.
 - d. 22 gauge, downspouts.
 - 3. Finish: Fluoropolymer enamel.
- B. Fasteners:
 - 1. Stainless Steel nails, flat-head.
 - 2. Galvanized steel, hot dipped, flat head.
- C. Cleats:
 - 1. 2 inches wide, 3 inches long piece of sheet metal.
 - 2. 16 oz., unless otherwise specified.
- D. Bituminous Paint:
 - 1. Asphalt emulsion, ASTM D 1187, Type A.
- E. Sealant:
 - 1. One-part butyl rubber sealant, FS TT-S-00657, Type 1.
- F. Metal Accessories:
 - 1. Provide sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed, non-corrosive, size and gauge required for performance.

2.02 FABRICATION

- A. Form metal flashing and trim to configurations indicated on the Drawings, free from defects which impair strength or mar appearance.
- B. Seams:
 - 1. Make seam in direction of flow.
 - 2. Seams must be locked, unless otherwise approved.
 - 3. Gutter and downspout seams may be lapped.
- C. All exposed edges not seamed shall be hemmed, bent back 1/2 inch to unexposed side.
- D. Furnish edge strips where sheet metal extends over edges and where necessary to secure sheet metal work at fascia, gravel stops, etc. Form edge strips of compatible material.

PART 3 - EXECUTION

3.01 GENERAL

- A. Examine all surfaces to receive the metal flashing and trim. Verify all dimensions of in-place and subsequent construction. Installation of metal flashing and trim constitutes acceptance of the existing conditions.
- B. Surfaces to which sheet metal is to be applied shall be smooth, sound, clean, dry and free from defects that might affect the application.
- C. Erect all member plumb, level and in line securely anchored and properly related to other parts of the Work.
- D. Protect metal surfaces which are to be in contact with dissimilar metals, with wood or other absorptive material, with roofing felt, building paper or a coat of bituminous paint specified to prevent galvanic or corrosive action. Protection shall not extend onto exposed surfaces.

3.02 INSTALLATION

- A. Gutters:
 - 1. Profile and dimensions as shown on drawings
 - 2. Continuous 10'-0" lengths with 6" splice plate to allow thermal movements.
 - 3. Lap joints 1 inch minimum and rivet.
 - 4. Fabricate outer edge 1/2 inch minimum lower than back edge.
 - 5. Stiffen outer edge with hemmed return.
 - 6. Secure end caps with 1 inch minimum width flanges riveted and sealed.
 - 7. Secure gutter with matching metal straps spaced 2 feet apart maximum.
 - 8. Locate and shape outlet thimble to fit downspouts and extend 2 inches below gutter soffit.
 - 9. Rivet and seal thimble flanges to gutter bottom.
- B. Downspouts:
 - 1. Profile and dimensions as shown on drawings
 - 2. Form with flat sheet material, plain rectangular size indicated.
 - 3. Fabricate longitudinal joints with flat lock seams.
 - 4. Telescope upper sections onto lower sections 1-1/2 inches minimum.
 - 5. Rivet and solder.
 - 6. Attach to wall with 1 inch wide straps matching downspout material, 1 gauge heavier.
 - 7. Locate straps at downspout tops, bottoms, and at 10 feet maximum centers.
 - 8. Secure straps to wall with fastener heads covered with strap tabs.
 - 9. Fit strainers tightly in each downspout.

3.03 CLEANING AND PROTECTION

- A. Protect flashing and sheet metal work during construction to insure that work will be without damage or deterioration, other than natural weathering, at time of substantial completion.

SUBMITTAL CHECK LIST

- 1. Shop Drawings.
- 2. Samples.

END OF SECTION 07600

SECTION 07725 - ROOF SCUTTLE AND LADDER

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide non-rated roof hatch scuttle, ladder and telescoping safety post as shown on the Drawings and specified herein.
- B. Provide safety rail system at each roof hatch opening location.

1.02 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's product data sheets, cutsheets, specifications, materials description, installation and maintenance instructions.
- B. Shop Drawings:
 - 1. Plans, elevations, sections, details and equipment list.
 - 2. Indicate construction of units, field verified dimensions and all construction detailing required to coordinate with installation requirements.
- C. Warranty:
 - 1. Provide copy of warranty as specified herein.

1.03 WARRANTY

- A. Provide manufacturer's written warranty against defects in materials and workmanship for a period of five (5) years from the date of Substantial Completion.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide products, as approved by the Architect, from one of the following approved manufacturers:
 - 1. "Bilco"
 - 2. "Dur-Red"
 - 3. "Milcore"
 - 4. "Western Canwell"
 - 5. "Babcock-Davis"

2.02 MATERIALS

- A. Roof Hatch Scuttle:
 - 1. Basis of Specification: "Bilco", Type "S", #S-50.
 - 2. Size: 3'-0" length x 2'-6" width.
 - 3. Aluminum cover, aluminum frame.
 - 4. 11 gauge cover and frame.
 - 5. Standard factory mill finish.
 - 6. Manufacturer's standard integral 12" high curb with integral cap flashing, fully welded.
 - 7. Cover of breakformed hollow design with minimum 1" concealed insulation, overlapping flange with fully welded corners.
 - 8. Cover to be internally reinforced to resist a live load of 40 psf.

- B. Telescoping Safety Post:
 - 1. Basis of Specification: "Bilco", Model-1, "Ladder-Up".
 - 2. High strength steel.
 - 3. Black enamel factory finish.
 - 4. Stainless steel balancing spring.

- C. Ladder:
 - 1. Basis of Specification: "O'Keefe", Model 500.
 - 2. Aluminum construction, standard-duty, channel rail, fixed access ladder.
 - 3. 18 inches wide nominal (22 inches nominal overall) x custom height as required from floor to hatch.
 - 4. Aluminum angle wall and floor brackets as required per manufacturer for secure installation.
 - 5. 7 inch minimum backset from wall per OSHA requirements.
 - 6. 1-1/4 inch deeply serrated square rungs.
 - 7. Standard factory mill finish.
 - 8. Provide safety cages for all ladders 20' or more in height. Provide intermediate resting platform for ladders more than 30" in height.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instruction.

- B. Shim curb as required for level installation.

- C. Securely fasten all surfaces, clean, smooth and free from burrs or rough edges.

- D. Install flashing under Division 7.

SUBMITTAL CHECKLIST

- 1. Product Data.
- 2. Shop Drawings.
- 3. Warranty.

END OF SECTION 07725

SECTION 07900 - JOINT SEALERS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The extent of each form and type of joint sealer as indicated on the Drawings and specified herein.
- B. Types of joint sealants specified herein include:
 - 1. Elastomeric Sealants.
 - 2. Non-Elastomeric Sealants and Caulking Compounds.
 - 3. Concrete Precast Panel Sealants.
- C. In general, all joints are to have joint sealers, including but not limited to the following:
 - 1. Sidewalk Joints.
 - 2. Expansion and control joints.
 - 3. Flashing and coping joints.
 - 4. Interior wall/ceiling/door/window frame joints.
 - 5. Joints between dissimilar materials.
 - 6. Concrete precast panel joints.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Refer to Division 3 - concrete surfaces and precast wall panels.
- B. Refer to Division 8 - sections for glazing requirements.
- C. Refer to sections of Division 15 and 16 for joint sealers in mechanical and electrical work.

1.03 QUALITY ASSURANCE

- A. Except as otherwise indicated, joint sealers are required to establish and maintain airtight and waterproof continuous seals on a permanent basis, within recognized limitations of wear and aging as indicated for each application. Failures of installed sealers to comply with this requirement will be recognized as failures of materials and workmanship.

1.04 SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturer's product specifications, handling/installation/curing instructions and performance tested data sheets for each elastomeric product required.
 - 2. Submit certified test reports for elastomeric sealants on aged performances as specified, including hardness, stain resistance, adhesion, cohesion or tensile strength, elongation, low-temperature flexibility, compression set, modulus of elasticity, water absorption, and resistance (aging, weight loss, deterioration) to heat and exposures to ozone and ultraviolet light.
- B. Samples:
 - 1. Submit color charts for selection.
 - 2. Colors to be selected by Architect from manufacturer's entire selection.
 - 3. Multiple colors may be selected for differing substrates and/or conditions throughout the project.
- C. Additional Submittals for Concrete Precast Walls (see Concrete Precast Wall Panel Sealant):
 - 1. Certification of compatibility with paint.

1.05 JOB CONDITIONS

- A. Do not proceed with installation of liquid sealants under unfavorable weather conditions. Install elastomeric sealants when temperature is in lower third of temperature range recommended by manufacturer for installation.

1.06 WARRANTY

- A. The Contractor shall provide a warranty against failure of sealant materials and workmanship including replacement of other materials damaged as a result of sealant failure for five (5) years from the date of Substantial Completion. Typical for all sealants at all locations and conditions, unless otherwise indicated.

PART 2 - PRODUCTS

2.01 GENERAL

- A. General Sealer Requirements:
1. Select materials for compatibility with joint surfaces and other indicated exposures, and except as otherwise indicated, select modulus of elasticity and hardness or grade recommended by manufacturer for each application indicated.
 2. Where exposed to foot traffic, select non-tracking materials of sufficient strength and hardness to withstand "stiletto" heel traffic without damage or deterioration of sealer system.
 3. Provide colors as selected by Architect from the manufacturer's entire available color selection. Colors are to be selected for each differing material and condition. Various colors of each product are to be expected.

2.02 ACCEPTABLE MANUFACTURERS

- A. Provide products, as approved by the Architect, by one of the following approved manufacturers:
1. Manufacturers of Elastomeric Sealants (Liquid):
 - a. "Sonneborn / BASF Building Systems"
 - b. "Tremco, Inc."
 - c. "Capital Services"
 - d. "DOW Corning"
 2. Mfrs. of Non-Elastomeric Sealants (Liquid/Tape):
 - a. "Sonneborn / BASF Building Systems"
 - b. "Tremco, Inc."
 - c. "Capital Services"
 - d. "DOW Corning"
 3. Mfrs. of Joint Fillers/Sealant Backers:
 - a. "Sonneborn / BASF Building Systems"
 - b. "Backer Rod Mfr. & Supply Co."
 - c. "Williams Products, Inc."
 4. Mfrs. of Concrete Precast Panel Sealant:
 - a. "Sika"

2.03 ELASTOMERIC SEALANTS

- A. To be used at interior/exterior joints subject to movement: control joints, expansion joints, etc.
- B. Multi-Component Polyurethane Sealant: Except as otherwise indicated, provide manufacturer's standard, non-modified, 2-or-more-part, polyurethane-base, elastomeric sealant; complying with ASTM C920 Type M Class 25, non-sag grade/type.

- C. Modulus and Hardness: Where self-leveling grade/type is required, provide sealant with cured modulus of elasticity at 100% elongation of not more than 150 psi (ASTM D 412 test procedure), and Shore A hardness of not less than 55 (ASTM D 2240). Where non-sag grade/type is required, provide sealant with cured modulus of elasticity at 100% elongation of not more than 75 psi and Shore A hardness of 20 to 30.
- D. Tear Resistance: Not less than 50 lb. per inch (ASTM D 624).
- E. Acceptable Products:
 - 1. "Sonneborn", Sonolastic NP 1.
 - 2. "Sonneborn", Sonolastic NP 2.
 - 3. "Sonneborn", Sonolastic SL I.
 - 4. "Tremco", Dymeric.

2.04 NON-ELASTOMERIC SEALANTS AND CAULKING COMPOUNDS

- A. For general use as an exposed building construction sealant provide acrylic terpolymer, solvent-based, one-part, thermo-plastic sealant compound; solids not less than 95% acrylic.
- B. Performance Standard: Comply with either ASTM C 920 Type S Class 12-1/2 Grade NS or Class B Type Non-Sag.
- C. Bond and Cohesion: Comply with ASTM C 910, with less than 0.50 square inches of combined cohesion and bond failure for three (3) samples.
- D. Acceptable Products:
 - 1. "Sonneborn", Sonolac.
 - 2. "Tremco", Mono.

2.05 MISCELLANEOUS MATERIALS

- A. Joint Primer/Sealer:
Provide type of joint primer/sealer recommended by sealant manufacturer for joint surfaces to be primed or sealed.
- B. Bond Breaker Tape:
Provide Polyethylene tape or other plastic tape as recommended by sealant manufacturer; to be applied to sealant-contact surfaces where bond to substrate or joint filler must be avoided for proper performance of sealant. Provide self-adhesive tape where applicable.
- C. Sealant Backer Rod:
Provide compressible rod stock of polyethylene foam, polyurethane foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable non-absorptive material as recommended by sealant manufacturer for back-up of, and compatibility with sealant.

2.06 CONCRETE PRECAST WALL PANEL SEALANTS

- A. Description:
 - 1. For use on all interior and exterior joints at concrete precast wall panels.
 - 2. Two-component, premium-grade, polyurethane-based, elastomeric sealant.
 - 3. Performance standards to comply with ASTM C-920, Type M, Grade NS, Class 25.

- B. Joint Sealants and Paint:
 - 1. The joint sealant and paint are required to be compatible with one another and together shall be considered to be a complete system.
 - 2. Provide joint sealant manufacturer's certification of compatibility with paint.
 - 3. Joint sealants are NOT to be painted or installed prior to painting of tilt wall surfaces.
- C. Protection of Precast Concrete Wall Joints:
 - 1. Install backer rod at front of joint to be sealed, at location of final sealant installation.
 - 2. Once tilt wall surfaces are completely painted, backer rod is to be pushed back into the joint to allow for installation of the sealant in its proper final location.
 - 3. This allows the backer rod to temporarily cover the side surfaces of the tilt wall joint where the sealant will be installed so that these surfaces remain unpainted and allow for proper adhesion of the joint sealants to the tilt wall surfaces within the joint.
- D. Color:
 - 1. To be selected by Architect from manufacturer's entire selection.
 - 2. Multiple colors may be selected at no additional cost if deemed necessary for color schemes.
- E. Acceptable Products:
 - 1. "Sika", Sikaflex-2c NS.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Examine substrates, (joint surfaces) and conditions under which joint sealer work is to be performed. Do not proceed with joint sealer work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Clean joint surfaces immediately before installation of sealants. Remove dirt, insecure coating, moisture and other substrates which could interfere with bond of sealant. Etch concrete and masonry joint surfaces as recommended by sealant manufacturer. Roughen vitreous and glazed joint surfaces as recommended by sealant manufacturer.
- B. Set joint filler units at depth or position in joint as indicated to coordinate with other work, including installation of bond breakers, backer rods and sealants. Do not leave voids or gaps between ends of joint filler units.
- C. Install sealant backer rod for liquid-applied sealants, except where shown to be omitted or recommended to be omitted by sealant manufacturer for application indicated. Install backer rod at all areas required for proper installation of sealant.
- D. Install backer rods at any location necessary for proper installation of all sealants, whether shown on drawings or not.
- E. Install bond breaker tape where indicated and where required by manufacturer's recommendations to insure that liquid-applied sealants will perform as intended.
- F. Employ only proven installation techniques, which will insure that sealants are deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of joint bond surfaces equally on opposite sides. Except as otherwise indicated, fill joints with sealant to a slightly concave surface slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface and vertical

surfaces, fill joint to form a slight cove, so that joint will not trap moisture and dirt.

- G. Install liquid applied sealant to depths as shown or, if not shown, as recommended by sealant manufacturer but within the following general limitations:
 - 1. For normal moving joints sealed with elastomeric sealants but not subject to traffic, fill joints to a depth equal to 50% of joint width, but neither more than 1/2 inch deep nor less than 1/4 inch deep.
 - 2. For joints sealed with non-elastomeric sealants and caulking compounds, fill joints to a depth in range of 75% to 125% of joint width.
- H. Do not allow sealants or compounds to overflow from confines of joints, or to spill onto adjoining work, or to migrate into voids of exposed finishes. Clean adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage.
- I. Do not overheat or reheat hot-applied sealants.

3.03 PROTECTION

- A. Cure sealant compounds in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability.
- B. Protect joint sealers during construction period, so that they will be without deterioration or damage (other than normal wear and weathering) at time of substantial completion. Replace or restore sealants which are damaged or deteriorated during construction period.

SUBMITTAL CHECK LIST

- 1. Product Data.
- 2. Warranty.
- 3. Additional Submittals for Precast Concrete Walls.

END OF SECTION 07900

SECTION 08110 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Hollow metal doors and frames as shown on the Drawings and specified herein, including:
1. Hollow steel doors and frames.
 2. Hollow metal window-walls, glazed openings, and other hollow metal frames for glass.
 3. Rough bucks, frame reinforcing, door reinforcing, door insulation, closer reinforcements, clip angles and anchorage.
 4. Factory prime paint finish.
 5. Grouting of hollow metal frames with masonry mortar where not covered under other Sections.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 03300 - Cast-In-Place Concrete.
Section 04220 - Concrete Unit Masonry.
Section 06100 - Rough Carpentry.
Section 08710 - Finish Hardware.
Section 08800 - Glass and Glazing.
Section 09900 - Painting.

1.03 REFERENCES

- A. The following standards, tests and publications may be referred to herein and are applicable to this Section:
1. ANSI A250.8-1998/SDI-100 - Recommended Specifications - Standard Steel Doors and , Steel Door Institute, unless herein specified.
 2. UL 10C-98 and UBC 7-2 – Positive Pressure Fire Tests of Door Assemblies.
 3. NFPA-80-1999 – Standard for Fire Doors and Windows.
 4. NFPA-101-1997 – Life Safety Code.
 5. NFPA-105 – Standard for Smoke and Draft Control Assemblies.
 6. ASTM-A 366-95A – Specification for Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality.
 7. ASTM-A 568-95 – Specification for Steel, Sheet, Carbon, and High Strength, Low-Alloy, Hot-Rolled, and Cold-Rolled.
 8. ASTM-A 569-91a – Specification for Steel, Carbon, (0.15 maximum percent), Hot-Rolled Sheet and Strip Commercial Quality.
 9. ASTM-A 924-95 – General Requirements for Steel Sheet, Metallic Coated by the Hot-Dip Process.
 10. SDI-105-92 – Recommended Erection Instructions for Steel Frames.
 11. ANSI A115.1-.18 - Specification for Door and Frame Preparation for Hardware.
 12. ANSI A156.7 - Standard Template Hinge Dimensions.

1.04 SUBMITTALS

- A. Product Data:
1. Manufacturer's specifications for fabrication and installation, including data substantiating products comply with requirements.
 2. Manufacturer's published product data sheets.
- B. Shop Drawings:
1. Show type of door and frame for each opening, sections of all typical members, dimensioned elevations, anchors, reinforcements and other required components.
 2. Preparation for installing hardware and glazing.

1.05 QUALITY ASSURANCE

- A. Provide doors and frames complying with Steel Door Institute "Recommended Specifications: Standard Steel Doors and Frames" (SDI-100) and as herein specified.
- B. Wind Load Performance Requirements: Comply with wind load requirements of the applicable State Building Code. Deflection shall not exceed 1/175 of span.
- C. Supplier Qualification: Qualified direct distributor of products to be furnished. The distributor shall have in their regular employment an A.H.C./C.D.C. or person of equivalent experience who will be available at reasonable times to consult with the Architect, Contractor and/or Owner regarding any matters affecting the total door and frame openings.
- D. Installer Qualification: Experience with installation of similar materials.
- E. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated or required, provide fire-rated door and frame assemblies that comply with NFPA 80 "Standard for Fire Doors and Windows", and have been tested, listed, and labeled in accordance with ASTM E152 "Standard Methods of Fire Tests of Door Assemblies" by nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction.
 - 1. Oversize Fire-Rated Door Assemblies: For door assemblies required to be fire-rated and exceeding sizes of tested assemblies, provide certificate or label from approved independent testing and inspection agency, indicating that door and frame assembly conforms to requirements of design, materials and construction as established by individual listings for tested assemblies.
 - 2. Temperature Rise Rating: At stairwell enclosures, provide doors which have Temperature Rise Rating of 450 degrees F maximum in 30 minutes of fire exposure.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver, handle and store doors and frames at the job site in such a manner as to prevent damage.
- B. Remove all damaged or otherwise unsuitable doors and frames.
- C. Deliver hollow metal doors in manufacturer's protective covering. Handle hollow metal with care to prevent damage.
- D. Door Storage: Store doors in upright position, under cover. Place doors on at least 4 inch high wood sills or on floors in manner that will prevent rust and damage. Do not use non-vented plastic or canvas shelters which create humidity chamber and promote rusting. If corrugated wrapper on door becomes wet, or moisture appears, remove wrapping immediately. Provide 1/4 inch space between doors to promote air circulation.
- E. Frame Storage: Store frames under cover on 4 inch wood sills on floors in manner that will prevent rust and damage. Do not use non-vented plastic or canvas shelters which create humidity chamber and promote rusting. Store assembled frames in vertical position, 5 units maximum in stack. Provide 1/4 inch space between frames to promote air circulation.
- F. Deliver doors and frames to the jobsite in stages or shipments as required for phasing, and in a timely manner so as not to delay progress of other trades.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A. Provide products, as approved by the Architect, by one of the following acceptable manufacturers:
1. CECO Door Products.
 2. Curries.
 3. Steelcraft Manufacturing Company.
 4. Metal Products.
 5. Republic Builders Products.
 6. Fenestra.
 7. Kewanee Corporation.
 8. Pioneer Industries, Inc.
 9. Atlas Companies.
 10. Deansteel Manufacturing Company, Inc.
 11. Mesker

2.02 MATERIALS

- A. Cold-Rolled Steel Sheets:
1. Commercial quality, stretcher leveled flatness, cold-rolled steel, free from scale, pitting or other surface defects.
 2. Complying with ASTM A 366 and ASTM A568.
- B. Supports and Anchors:
1. Fabricate of not less than 16 gauge galvanized sheet steel.
 2. Provide all blocking, backings and supports in all horizontal and vertical members as required for reinforcing of all door hardware as specified in Section 08710.
- C. Inserts, Bolts and Fasteners:
1. Manufacturer's standard units, except hot-dip galvanize items to be built into exterior walls.
- D. Primer:
1. For steel surfaces, use rust-inhibitive zinc oxide primer suitable as a base for specified finish paints.

2.03 FABRICATION

- A. General:
1. Fabricate hollow metal work to be rigid, neat in appearance and free from defects, warp, or buckle.
 2. Accurately form metal to required sizes and profiles.
 3. Weld exposed joints continuously; grind and dress smooth.
 4. Provide doors and frames bearing UL labels as scheduled. Construction similar to specified hollow metal work, modified to meet Underwrites Laboratories, Inc. requirements.
- B. Minimum Gauges of Hollow Metal:
1. Frames:
 - a. 16 gauge: Interior door frames.
 - b. 16 gauge: Typical labeled interior frames.
 - c. 16 gauge: Interior glazed window and opening frames.
 2. Doors:
 - a. 18 gauge: Interior doors.
 - b. 18 gauge: Typical labeled interior doors.
 3. Accessories:
 - a. 20 gauge: Trim members.
 4. Provide heavier gauges at doors, frames and accessories as required by fire rating label, details or specific condition.
 5. Entire frame, sidelight and transom unit shall be of the same gauge.

D. Doors:

1. Form face sheets in smooth seamless unbroken surface. Construct doors with smooth flush surfaces, without visible joints or seams on exposed faces or stile edges. Interior and exterior door edge seams shall be full height wire welded and ground smooth.
2. Reinforce, stiffen and sound deaden.
3. Stiffen face sheet with 20 gauge steel stiffener reinforced vertically, full height and width, spot welded to both face sheets. Stiffeners welded together top and bottom.
4. Close top and bottom edges of interior and exterior doors with continuous recessed flush steel channel minimum 16 gauge, extending full width of door, and spot welded to both faces. Provide drain holes in bottom closure of exterior doors.
5. Frame openings for glazing and provide cut-outs for glass and louvers with stops as shown. Form beads of 20 gauge steel; locate on inside of opening.
6. Labeled Doors: Insulate as required by Underwriters Laboratories. Build in special hardware and provide astragals as indicated. At one hour and at 1-1/2 hour doors at enclosures, maximum transmitted temperature end point shall not exceed 450 degrees F above ambient at end of 30 minutes of fire exposure per U.L.
7. Interior Hollow Metal Door Louvers: Fabricate of 20-gauge cold-rolled steel sheets with stationary sightproof inverted V-shaped blades and U-shaped frames. Space louver blades not more than 3 inches o.c. Assemble units by welding.
8. Typical Reinforcement: Provide as required for hardware items. For lock reinforcement, provide manufacturer's standard reinforcement. Provide 12 gauge reinforcement for escutcheons or roses. centering clips to hold lock case in alignment. For door checks, provide 14 gauge channel type reinforcements, 3-1/2 inch deep by 14 inches long, or as required. Hinge reinforcement to be one piece 14 gauge continuous channel welded to the door. Reinforce doors for surface items such as surface and semi-concealed closers, brackets, surface holders and door stops. Drilling and tapping installation of these surface items shall be done in field by hardware installer.
9. Provide to design indicated including: Flush panel doors, flush panel with cut-out as indicated, stile and rail type, stile and rail with door louver.
10. Finish: Provide prime coat finish on doors. Thoroughly clean off rust, grease and other impurities. Grind welds smooth, no marks shall show. Apply metallic filler as required to fill cracks and joints and to level any weld areas or similar imperfections. Sand filler coat smooth.

E. Frames:

1. Welded Frames. Knockdown frames not permitted, except where specifically indicated by Architect.
2. Close corner joints tight with trim faces mitered and continuously welded, ground smooth.
3. Provide dust cover boxes for hinge and strike plate cutouts and at all other hardware mortises.
4. Weld temporary steel spreader to feet of both jambs, or strap pairs with heads inverted, as bracing during shipping and handling.
5. Rated frames where indicated on drawings and at all rated door openings.
6. At masonry, provide wire or masonry "T" anchors approximately 24 inches on center.
7. Provide and secure galvanized steel drip cap at all exterior doors, field painted to match frame.
8. Silencers: Provide specified silencers, except where stop does not occur and at smoke gasketed openings, 3 per jamb at single door and one for each door at double doors.
9. Extensions: Reinforce transom bars or mullions as necessary to provide rigid installation. Where required (as at multiple openings) to stabilize large frames, provide frame or mullion extensions to anchor to structure above, proper size to fit within overhead construction. Provide angle clips to fasten to structure.
10. Mullions: Provide mullions, straight and without twist, of tubular design. No visible seams will be accepted. For removable mullions provide reinforcing at frame head.

11. Clearances: Provide and be responsible for proper clearances at metal frames, including for weatherstripping, soundstripping and smoke gasketing. Glass clearance shall be thickness of glass plus clearance each side (1/8 inch minimum exterior - 1/16 inch minimum interior), adjust for installation, glass thickness to allow for glazing and sealant. Where sealed double glazing is indicated, provide rebates minimum of 3/4 inch and provide 1/4 inch clearance at glass edges. Where units fit around concrete blocks (blocks built into frames) obtain actual dimensions of blocks being used to establish minimum clearances.
 12. Stops: Set with countersunk or Jackson head screws.
 13. Labeled Frames: Construct in accordance with requirements for labeled work. Attach proper U.L. label, Warnok Hersey. "B" labeled frames shall be 1-1/2 hour construction.
 14. Joinings: Furnish frames mitered, or coped, and continuously face welded. Grind smooth, and conceal joints for a seamless appearance. Touch up welded surfaces with manufacturer's standard prime paint.
 15. Workmanship: Fabricate so no grind marks, hollow or other out-of-plane areas are visible. At joints of intermediate members (such as mullions and transom bars), provide tight joining, neatly accomplished without holes, burned out spots, weld build up or other defacing work. Fill to close cracks and to preserve shapes. Tightly fit loose stops, to hairline joints.
 16. Finish: Clean frames by degreasing process and apply thorough coating of baked-on primer, covering inside as well as outside surfaces. At galvanealed frames, coat welds and other disrupted surface with zinc-rich paint containing not less than 90 percent zinc dust by weight.
- F. Hardware Preparation:
1. Mortise, reinforce, drill and tap doors and frames for mortised hardware.
 2. Prepare strike jamb for 3 silencers on door side.
 3. Typical Reinforcing: Provide minimum hinge reinforcement 3/16 inch by 1-1/2 inch by 10 inch. Provide similar reinforcement for hardware items as required to adequately withstand stresses, minimum 12 gauge, including channel reinforcement for door closers and closer arms, door holders and similar items. Provide reinforcement and clearances for concealed in-head door closers and for mortise locks, where applicable.
 4. Anchorage: Provide standard and special anchorage items as required.
 5. Cover Plates: For hinge and strike plate cutouts, provide fully enclosed pressed steel cover boxes spot welded to frames behind mortises.
- G. Finish:
1. Chemically treat and apply manufacturer's standard rust inhibitive primer coat conforming to ANSI A224.1-1990.
 2. Coat interior of frame with bituminous paint, minimum 1.5 mils.
 3. Prep surfaces to receive finish painting in the field.
- H. Fastenings:
1. Provide fastenings, anchors and clips as required to secure hollow metal work in place.
 2. Provide Jackson head screws, or flatter.
 3. Dimple metal work to receive screw heads.
 4. Set stops and other non-structural fastenings with #6 Jackson head self-tapping screws.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine supporting structure and conditions under which hollow metal is to be installed.
- B. Verify that frame opening corresponds to dimensions of frames furnished.
- C. Check that surfaces to contact frames are free of debris.
- D. Do not proceed with installation until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. General:
1. Install in accordance with reviewed shop drawings and manufacturer's printed instructions.
 2. Set hollow metal plumb, level, square to proper elevations, true to line and eye.
 3. Units and trim shall be fastened tightly together, with neat, uniform and tight joints.
- B. Anchorage:
1. Attach anchors to opening.
 2. Minimum number of anchors: 3 per jamb.
 3. Securely fasten and anchor work in place without twists, warps, bulges or other unsatisfactory or defacing workmanship.
 4. Set clips and other anchors with Ramset "shot" anchors or drill in anchors as approved.
- C. Frames:
1. Attach frames true to line with adjacent construction.
 2. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set.
 3. After wall construction is complete, remove temporary braces and spreaders leaving surfaces smooth and undamaged.
 4. At cast-in-place concrete or masonry construction, set frames and secure in place using countersunk bolts and expansion shields, with bolt heads neatly filled with metallic putty, ground smooth and primed.
- D. Doors:
1. Hang doors square to opening.
 2. Minimum Clearances:
 - a. At head and jambs: 1/8".
 - b. Between meetings edges of pairs of doors: 1/8".
 - c. With Floor: 3/4", except 3/8" undercut at handicap accessible doors.
 - d. At Threshold: 1/4".
 - e. At Handicap Threshold: As required to coordinate with threshold height.
 3. Fit hollow metal doors accurately in their respective frames, within following clearances:
 - a. Jambs and head 3/32 inch.
 - b. Meeting edges pair of doors 1/8 inch.
 - c. Sill where no threshold or carpet 1/4 inch above finished floor.
 - d. Sill at threshold 3/4 inch maximum above finished floor.
- E. Labeled Doors and Frames:
1. Install in conformance with NFPA Standard 80.
 2. Provide clearances in conformance with NFPA Standard 80.

3.03 ADJUST AND CLEAN

- A. Remove dirt and excess sealants from metal surfaces.
- B. Touch up marred or abraded surfaces.
- C. Lubricate hardware and adjust moving parts to operate smoothly.
- D. Remove debris from work area.
- E. Prime Coat Touch-Up: Modify existing doors and frames to receive new door hardware. Cut, patch, weld, bondo, and sand smooth, modified areas. Modifications will be seamless and not noticeable. Use compatible air-drying primer.
- F. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

SUBMITTAL CHECKLIST

- 1. Product Data.
- 2. Shop Drawings.

END OF SECTION 08110

SECTION 08330 - COILING COUNTER DOOR – ALUMINUM FINISH

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish and install complete, an aluminum coiling counter door with all required supports, trim and accessories as shown on the Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 05500 - Miscellaneous Metals

1.03 SUBMITTALS

A. Product Data:

- 1. Manufacturer's catalog data, cutsheets, literature, specifications and installation instructions.

B. Shop Drawings:

- 1. Show location of each door, plans, elevations, details and methods of anchorage to openings, details of construction, required clearances, anchors, and accessories, locations and installation of hardware, size, shape, and thickness of materials, joints and connections.

C. Samples:

- 1. Submit aluminum finish samples for selection and approval.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver and store unit in manufacturer's carton properly labeled as to product, project, etc.

- B. Protect unit from moisture and construction damage.

1.05 WARRANTY

- A. Provide manufacturer's written guarantee against defects in material and workmanship for a period of two (2) years from Substantial Completion.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

- A. Provide one of the following approved products (typical counter door, non-rated):

- 1. "Cornell" Rolling Counter Doors, ESC10.
- 2. "Overhead Door Corporation" Rolling Counter, 652 Series.
- 3. "The Cookson Company" Push-Up Counter Door, CD10 Series.
- 4. "Wayne-Dalton Corp." Rolling Counter Shutters.
- 5. "C.H.I. Rolling Steel Doors" Counter Shutter, Series 6500.

2.02 MATERIALS

A. Mounting:

- 1. Face of wall.
- 2. Mount on inside face of room, guides and all items interior to room.
- 3. Maintain clearance of full opening in wall.

- B. Curtain:
 - 1. Extruded aluminum 6063 alloy, .040" thick minimum.
 - 2. Interlocking, 1-1/2" high, flat slats with nylon end caps.
 - 3. Finish: Clear anodized.

- C. Bottom Bar:
 - 1. Extruded aluminum 6063 alloy.
 - 2. Reinforcing member attached to bottom of the curtain.
 - 3. Equipped with vinyl astragal/weather seal to cushion the contact point on the counter.
 - 4. Prep to include integral locking mechanism.
 - 5. Finish: anodized aluminum to match curtain.

- D. Guides:
 - 1. Extruded aluminum 6063 alloy.
 - 2. Side rail assemblies that bolt to the wall and support the entire weight of the counter door unit.
 - 3. Include pile lining of polypropylene, wool or felt.
 - 4. Finish: anodized aluminum to match curtain.

- E. Hood:
 - 1. Extruded aluminum 6063 alloy, .040" thick minimum.
 - 2. Protective sheet metal enclosure for the curtain that provides safety and weather resistance at the head of the counter door and keeps the brackets rigid.
 - 3. Finish: anodized aluminum to match curtain.

- F. Shaft:
 - 1. Steel tubing with sealed ball bearings.
 - 2. Contains integral counterbalance torsion springs for assisting operation.
 - 3. 3" diameter minimum outer shaft, 5/8" diameter minimum inner shaft.

- G. Locking Device:
 - 1. Cylinder locking device.
 - 2. Install universal cylinder and key to building master key system per Owner.

- H. Operation:
 - 1. Manual push-up with finger lifts in bottom bar.
 - 2. Removable pull down pole.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Field verify all requirements prior to fabrication including, but not limited to, dimensions, opening coverage, substrates, supports, access and clearances required, and control locations.

- B. Strictly comply to manufacturer's installation instructions and recommendations,

- C. Coordinate installation with adjacent work and all other trades.
Allow for required clearances for operation and maintenance.

- D. Install and anchor structural supports in time for masonry work.

- E. Set guides on metal frame in wall opening in true alignment.

- F. Anchor guides and hood securely.
- G. Test for proper operation. Adjust and lubricate as required for smooth and proper operation without binding, distortion, or any malfunctions.
- H. Touch-up and repair any minor damages to finishes and coatings.
Replace in whole if damaged beyond condition acceptable to the Architect and Owner.

SUBMITTAL CHECKLIST

- 1. Product Data.
- 2. Shop Drawings.
- 3. Samples.

END OF SECTION 08330

SECTION 08342 – HORIZONTAL BIFOLD INDUSTRIAL DOOR

PART 1 – GENERAL

1.01 WORK INCLUDED

- A. Motor operated, 2-section, custom fabricated bifold door system.
- B. Work includes all labor, materials, accessories and hardware to furnish and install complete and operating door systems as indicated on the Drawings and specified herein.
- C. Work by others includes preparation of the building to receive the door, field wiring, field finish painting, top guide supports, interior/exterior metal sheeting and insulation.

1.02 SUBMITTALS

- A. Approval of shop drawings is required prior to fabrication of the bifold door system.
- B. Shop Drawings:
 - 1. Door operations and general maintenance manuals.
 - 2. Fabrication drawings showing detailed construction of the framing, including bottom rails, top rails, wheel housings, top hinge assemblies, cable and/or rod bracing, door locations and framing, stiles, top and bottom frames, cold form materials and mounting clips.
 - 3. Wiring schematics information including field wiring, location of junction boxes, physical locations of devices.
 - 4. Structural design data and seal of professional engineer, licensed in state of project location.
 - 5. Miscellaneous weather seals and accessories.

1.03 QUALITY ASSURANCE

- A. Acceptable Manufacturers
 - 1. Schweiss Doors
Fairfax, Minnesota
(800)746-8273
 - 2. Aero-Door, Inc.
2770 Dillard Road
Eustis, FL 32726
(866) 226-3667

1.04 WARRANTY

- A. The door manufacturer shall provide a non-limited written warranty for all materials and workmanship for a period of 2 years from date of substantial completion.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. All door section framing members, both vertical and horizontal, shall be hot rolled standard structural steel sections equal to or exceeding ASTM A-36 and comply with AISC specifications. Cold formed “C” and “Z” shapes may be used for girts or bracing.
- B. Door Section Construction:
 - 1. Fabricated in sizes convenient for shipping and shall be of bolted and/or welded construction.
 - 2. Framing members shall be true to dimension and square in all directions.
 - 3. Diagonal bracing shall be provided so that the completed door section assembly will be adequately braced to withstand operational loads.

- C. Weather Seals:
 - 1. Factory attached to vertical edges, sill and head
 - 2. Vertical Seals:
 - a. Bulb type sheet rubber EPDM with resilient urethane foam core.
 - b. Opposing bulb weather seals between door sections shall seal against each other and not come in contact with the door sheeting.
 - 3. Head and sill seals shall be lap type sheet rubber EPDM
 - 4. All weather seals shall be retained with full length steel binding strips attached with rust resistant fasteners.

- D. Top Hinges:
 - 1. Top door section to have total of nine (9) hinges
 - 2. Hinges shall be secured to precast wall panel header

- E. Bi-Fold Hinges:
 - 1. Total of nine (9) hinges connecting the top and bottom rollers.
 - 2. Bearings shall be provided with grease seals

- F. Side Guide Assemblies:
 - 1. Side guide assemblies consisting of angles shall be factory fabricated sub-assemblies
 - 2. Assemblies shall accommodate the side roller assemblies.

2.02 OPERATING SYSTEM

- A. Winch System
 - 1. Door shall be operated by an electric motor winch system.
 - 2. Roller straps and strap tensioning devices.
 - 3. Total of five (5) lift points

- B. Electric Motor:
 - 1. Single electric motor operator shall drive all winch assemblies.
 - 2. Factory installed electric brake motor, gear reducer and required sprockets.
 - 3. 208 volt, 3-phase

2.03 ELECTRIC CONTROLS

- A. Shall include factory wired enclosure with disconnect switch, overload and under voltage protection, magnetic reversing starters, and control voltage transformer.

- B. Control circuits to be low voltage

- C. Limit switches shall be provided to stop travel of the door sections in their fully open or fully closed positions. Limit switches shall be factory mounted on the powered door section.

- D. Electric photo eye safety beam sensors across bottom of the opening

- E. Auto reverse safety sensor on bottom edge of door, full width.

PART 3 - EXECUTION

3.01 PREPARATION

- A. All door openings, roof and floor shall be completely installed prior to the installation of the door.
- B. Permanent or temporary electric wiring shall be brought to the door opening before installation is started.
- C. Field verify all existing conditions, building structure, rough openings, etc. before starting fabrication of the doors
- D. Clean all steel surfaces after fabrication and apply manufacturer's standard structural primer.

3.01 INSTALLATION

- A. Assemble and install bottom rail assemblies, top guide assemblies and door sections in accordance with approved drawings and installation instructions.
- B. Door shall be set plumb, level and square, and with all parts properly fastened, mounted, etc. All moving parts shall be tested and adjusted and left in good operating condition.
- C. Install wiring for electric operators under Division 16.
- D. Other trades will install insulation and metal sheeting.

3.02 CLEANING AND ADJUSTING

- A. Upon completion, remove all materials, equipment and debris from the premises.
- B. Inspection of the doors and complete operating test will be made by the installer in the presence of the general contractor and architect as soon as the erection is complete.
- C. Upon completion of insulation and metal sheeting, door installer will be required to make all necessary adjustments as a result of completing this work to the doors.

SUBMITTAL CHECKLIST

- 1. Product Data.
- 2. Shop Drawings.

END OF SECTION 08341

SECTION 08360 - SECTIONAL OVERHEAD DOORS

PART 1 – GENERAL

1.01 WORK INCLUDED

- A. Manual operated upward acting sectional type doors, non-insulated
- B. Work includes all labor, materials, accessories and hardware to furnish and install complete and operating door systems as indicated on the Drawings and specified herein.

1.02 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's published catalog information, product data sheets and cutsheets.
 - 2. Manufacturer's instructions on installation, operation and maintenance.
 - 3. Certification that springs have been tested and approved for specified higher cycles of use.
- B. Shop Drawings:
 - 1. Show locations, elevations, details and methods of anchorage.
 - 2. Indicate clearances required for all components and proper operation.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Store and handle so as to prevent damage.

PART 2 – PRODUCTS

2.01 STEEL DOORS – NON-INSULATED

- A. Provide one of the following approved products:
 - 1. "Overhead Door Corporation", 420 Series.
 - 2. "Clopay Building Products Company, Inc.", Model 520.
 - 3. "Haas Door Company", Model 220.
- B. Description:
 - 1. Panel Sections: Rolled 20 gauge galvanized steel, ribbed exterior surface, rabbeted meeting rails, full width interlocking, 2 inch nominal door thickness.
 - 2. Center and End Stiles: Formed and welded so as to be integral with panels. 16 gauge center stile, 16 gauge channel shaped end stiles.
 - 3. Tracks; Galvanized steel, 2 inches or 3 inches deep. Full Vertical track
 - 4. Track Supports: Intermediate vertical supports as required to properly secure track without interfering with proper operation of the door or posing a detrimental effect on any other item or trade.
 - 5. Hinges and Brackets: 14 gauge galvanized steel. Full floating ball-bearing rollers in case hardened steel races. Mounted to fit the taper of the track.
 - 6. Weatherstripping: One piece, full length, at perimeter of opening jambs and header. EPDM, extruded PVC, vinyl or neoprene.
 - 7. Bottom Section: Full length extruded aluminum astragal retainer, galvanized steel step plate and U-shaped flexible astragal.
 - 8. Finish: White, baked enamel, both sided. Prep to accept field paint, where applicable.
 - 9. Lock: Slide into track opening
 - 10. Operation: Manual lift

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install plumb, square, level and true.
- B. Provide wood blocking, steel angles, shims, brackets and all other accessories necessary for a complete and finished installation.
- C. Paint all exposed wood blocking and shims. Do not paint weatherstripping.
- D. Paint steel doors under Division 9.
- E. Install door, track and all accessories per manufacturers requirements, unless less stringent than Drawings and Specifications.

3.02 CLEANING AND ADJUSTING

- A. Upon completion, remove all materials, equipment and debris from the premises.
- B. Just prior to substantial completion, clean and touch up all surfaces, and check doors for proper operation. Adjust as necessary for tight fit and proper operation.

SUBMITTAL CHECKLIST

- 1. Product Data.
- 2. Shop Drawings.

END OF SECTION 08360

SECTION 08410 - ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, supervision and services required to complete the aluminum thermal-type and non-thermal type Entrances and Storefronts as shown on the Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 07900 - Joint Sealers
- Section 08520 - Aluminum Windows
- Section 08710 - Finish Hardware
- Section 08800 - Glass and Glazing

1.03 QUALITY ASSURANCE

- A. Comply with all Federal, State and Local building codes and regulations.
- B. Thermal Performance:
 - 1. AAMA Test Procedure 1502.7.
 - 2. Condensation Resistance Factor (CRF) of 43 (min.) at equivalent of 15 MPH wind velocity.
- C. Air Infiltration:
 - 1. ASTM E283.
 - 2. Maximum infiltration .06 CFM/ft. crack length under static pressure of 6.24 PSF (equivalent of 50 MPH wind velocity).
- D. Water Infiltration:
 - 1. ASTM E331.
 - 2. No water penetration for 15 minutes with 5 gal./hr./s.f. at 10.0 PSF pressure.
- E. Uniform Loading:
 - 1. ASTM E-330.
 - 2. Max. 1/175 deflection, no permanent deformation under a load of 25 PSF.

1.04 SUBMITTALS

- A. Shop Drawings:
 - 1. Submit complete shop drawings prior to fabrication.
 - 2. Indicate metal thickness, construction, installation and anchorage details.
- B. Samples:
 - 1. Section of window wall assembly with glass.
 - 2. If finish is selected, submit sample of finish indicated.
If not indicated, submit color and finish samples for selection by the Architect, from manufacturer's entire standard selection.
- C. Test Reports:
 - 1. Submit test reports certified by the mullion manufacturer's testing laboratory.
 - 2. Show compliance with performance requirements.
- D. Warranty:
 - 1. Submit warranty as specified herein.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver, handle and store doors and frames at the job site in such a manner as to prevent damage.
- B. Remove all damaged or otherwise unsuitable doors and frames from the job site.

1.06 WARRANTY

- A. Provide written manufacturer's guarantee against defective workmanship and materials for a period of two (2) years.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide thermal barrier type mullion window and door system, to be approved by the Architect, as manufactured by one of the following approved manufacturers:
 - 1. "EFCO"
 - 2. "Kawneer"
 - 3. "Tubelite"
 - 4. "Vistawall"
 - 5. "United States Aluminum"
 - 6. "Traco"
 - 7. "Wausau Window and Wall Systems"
 - 8. "Arch Aluminum and Glass"
 - 9. "YKK AP"
 - 10. "Manko Window Systems"
 - 11. "Graham Architectural Products"
- B. Clarification that any/all aluminum window, curtain walls and entrances and storefronts in the scope of work are to all be provided by a single source manufacturer for the entire project.
- C. Basis of Specification:
 - 1. Window Wall Systems:
 - a. "EFCO", Series 403 (T), Thermal Storefront Framing.
Provide at all locations exposed directly to the exterior.
 - 2. Door Systems:
 - a. Wide Stile: "EFCO", Series D500 Wide Stile Doors, 1-3/4" Standard Doors.
 - b. Custom modified to provide for widths and depths of stiles and rails as indicated on the Drawings, Door Elevations, and as specified herein.

2.02 MATERIALS

- A. Aluminum Extrusions:
 - 1. ASTM B 221.
 - 2. Alloy 6063-T5.
 - 3. Finish: Class 1, Clear Anodic Coating, AA-M12C22A41.
- B. Aluminum Sheets:
 - 1. ASTM B209.
 - 2. Alloy 5005 where exposed, 3003 where concealed.
 - 3. Finish: Match extrusions.

- C. Fasteners and Anchors:
 - 1. Stainless steel or aluminum, finish to match extrusions at exposed fasteners.

- D. Glass:
 - 1. 1 inch insulating glass for all exterior glass applications.
 - 2. See Section 08800 for glass specifications.
 - 3. See drawings for window, door and frame elevations.

- E. Thermal Break:
 - 1. Poured polyurethane or PVC, standard with manufacturer.
 - 2. 3/8 inch minimum thickness.

- F. Setting Blocks:
 - 1. As specified in Section 08800.

- G. Glazing Gaskets:
 - 1. Elastomeric gaskets of type recommended by window manufacturer.

- H. Glazing Tape:
 - 1. Shimmed polymer type recommended by window manufacturer.

- I. Perimeter Joint Sealer:
 - 1. As specified in Section 07900.

- J. Backup Joint Filler:
 - 1. Closed-cell expanded polyethylene, as specified in Section 07900.

- K. Joint Cleaner:
 - 1. Cleaner recommended by sealant manufacturer for the specified joint surface condition.

- L. Joint Primer and Sealer:
 - 1. Compounds recommended by sealant manufacturer for the specific joint surface conditions.

- M. Bond Breaker:
 - 1. Polyethylene tape.

- N. Weatherstripping:
 - 1. Neoprene, hypalon, vinyl, PVC, as standard with manufacturer, double row, continuous with vulcanized corners.

- O. Subsill:
 - 1. High Performance extruded aluminum with thermal break, and integral weep hole system.

- P. Provide all blocking, backings and supports in all horizontal and vertical members as required for reinforcing of all door hardware as specified herein or in Section 08710.

- Q. Hardware:
 - 1. See Section 08710 – Finish Hardware for all other items not listed herein.
 - 2. Cylinder Collars: Anodized aluminum. Cylinder specified in Section 08710.
 - 3. Weatherstripping (Provide on all exterior doors):
 - a. Vinyl, Neoprene, EPDM, TPE (thermoplastic elastomer), or silicone.
 - b. Full length and width of opening at each condition.

- c. Provide weatherstripping seal sets at entire perimeter jambs and head of all exterior doors, whether scheduled or not.
- d. All weatherstripping sets shall be determined by the door hardware supplier as appropriate to the application and able to provide a weather-tight and weather-proof seal, while allowing proper operation of the door and all other hardware.
- e. Jambs and Head:
Manufacturer's standard type per requirements of this specification herein.
- f. Meeting Astragal:
Manufacturer's standard type per requirements of this specification herein.
Coordinate with removable mullion, if applicable.
- g. Door Bottom Sweep:
Vinyl, Neoprene, EPDM, TPE (thermoplastic elastomer), or silicone weathersweep, screw applied to door with concealed fasteners. Finish to match door.

2.03 FABRICATION

- A. Window Wall Members:
 - 1. Main extruded members: Minimum thickness .075 inches minimum.
 - 2. Vertical and horizontal framing members: 2 inches nominal face dimension.
 - 3. Perimeter members: 2 inches nominal face dimension.
 - 4. Overall depth: 4-1/2 inches nominal.
- B. Door Members:
 - 1. Minimum Thickness: .075" minimum.
 - 2. Overall Depth: 1-3/4 inches nominal.
 - 3. Vertical Stiles: Provide as indicated on Drawings or Door Elevations (modified wide stile).
If not indicated, provide 5 inches nominal width (wide stile).
Reinforce for continuous hinges specified herein or in Section 08710.
 - 4. Top Rail: Provide as indicated on Drawings or Door Elevations (modified wide stile).
If not indicated, provide 5 inches nominal width (wide stile).
Reinforce for closers or holders specified herein or in Section 08710.
 - 5. Intermediate Panic Rail: Provide as indicated on Drawings or Door Elevations (modified wide stile).
If not indicated, provide 6 inches nominal width.
Location to be centered on panic device with dimension as required by Code and ADA.
Reinforce for panic devices specified herein or in Section 08710.
 - 6. Bottom Rail: 10 inches nominal width (modified). Accessory line as required for extra tall rail.
- C. Thermal Break:
 - 1. Provide thermal break on all window members.
 - 2. Poured in place, self-adhering elastomer.
 - 3. Do not violate or bridge the thermal break with hardware or fasteners.
- D. Preassemble all units to the greatest extent possible to minimize field jointing and assembly at the site. Disassemble units only to the extent necessary to comply with shipping limitations.
- E. Fabricate all units to produce uniform sight lines and to be level, plumb, and in same plane as adjacent panels.
- F. Accurately fabricate all joints for proper fit and weld all corners.
- G. Provide slotted holes or other acceptable means for erection adjustment.
- H. Protect exposed surfaces against damage from scratches and discoloration.

- I. Provide fully resilient settings for glass panels by use of neoprene gaskets on both sides of glass.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Examine all surfaces of opening and verify dimensions. Installation of frames constitutes acceptance of the existing conditions.

3.02 INSTALLATION

- A. Install window walls, doors and hardware in accordance with manufacturer's instructions.
- B. Assemble and anchor the various components to allow for expansion and contraction, maintaining a watertight condition.
- C. In general, for field assembly, conform to welding and joining requirements specified for shop fabrication.
- D. Install items plumb, straight, square, level and in their proper elevation, plane and location, and in proper alignment with other work. Employ only skilled workmen and erection.
- E. Install doors plumb and in alignment with frames. Apply hardware in accordance with hardware manufacturer's instructions. Drill and tap for machine screws. Adjust door installation for free and easy movement with uniform clearances and contact at stops.
- F. Use shims as required.
- G. Caulk perimeter after all lime, mortar, plaster and other corrosive materials have been removed from aluminum surface with solvents not harmful to finish. Provide backer rods as required.
- H. Install glass in window walls in accordance with recommendations of the mullion system manufacturer and requirements specified in Section 08800.

SUBMITTAL CHECKLIST

1. Shop Drawings.
2. Samples.
3. Test Reports.
4. Warranty.

END OF SECTION 08410

SECTION 08520 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools supervision and services required to install and complete the following systems:
 - 1. Aluminum thermal-barrier type windows - fixed units.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 07900 - Joint Sealers
- Section 08410 - Aluminum Entrances and Storefronts
- Section 08800 - Glass and Glazing

1.03 QUALITY ASSURANCE

- A. Performance Classification: AAMA PA3HP.
- B. Air Infiltration:
 - 1. ASTM E283.
 - 2. Maximum infiltration .10 CFM/ft. crack length under static pressure of 6.24 PSF (equivalent of 50 MPH wind velocity).
- C. Water Infiltration:
 - 1. ASTM E331.
 - 2. No water penetration for 15 minutes with 5 gal./hr./s.f. at 10.0 PSF pressure.
- D. Uniform Loading:
 - 1. ASTM E-330.
 - 2. Max. 1/175 deflection, no permanent deformation under a load of 25 psf.

1.04 SUBMITTALS

- A. Shop Drawings:
 - 1. Submit complete shop drawings prior to fabrication.
 - 2. Indicate metal thickness, construction, installation and anchorage details.
- B. Manufacturer's Data:
 - 1. Certified performance data.
 - 2. Submit with shop drawings.
- C. Warranty:
 - 1. Submit warranty as specified herein.

1.05 WARRANTY

- A. Provide written manufacturer's guarantee against defective workmanship and material for a period of two (2) years and weather-stripping for a period of five (5) years.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide systems, as approved by the Architect, from one of the following approved manufacturers:
1. "EFCO"
 2. "Kawneer"
 3. "Tubelite"
 4. "Vistawall"
 5. "United States Aluminum"
 6. "Traco"
 7. "Wausau Window and Wall Systems"
 8. "Arch Aluminum and Glass"
 9. "YKK AP"
 10. "Manko Window Systems"
 11. "Graham Architectural Products"
- B. Clarification that any/all aluminum windows, curtain walls, and entrances and storefronts in the scope of work are to all be provided by a single source manufacturer for the entire project.
- C. Basis of Specification:
1. "EFCO", 2700 Series.

2.02 MATERIALS

- A. Aluminum Extrusions:
1. ASTM B 221.
 2. Alloy 6063-T5.
 3. Finish: Class 1, Clear Anodic Coating, AA-M12C22A41.
- B. Thermal Break:
1. Poured polyurethane or PVC, standard with manufacturer.
 2. 3/8 inch minimum thickness.
- C. Glazing:
1. All self-contained window units to be pre-glazed and delivered to the jobsite complete for installation.
 2. Accommodate 1 inch insulated glass in fixed and ventilating sections.
 3. Vinyl bulb-shaped glazing seal.
 4. See Section 08800 and Drawings for glass specifications.
- D. Fasteners and Anchors:
1. Stainless steel or aluminum, finish to match extrusions at exposed fasteners.

2.03 FABRICATION

- A. Fabricate framing, sash, and louvers of extruded aluminum.
1. Nominal depth of sash: 4 inches, as shown on drawings.
 2. Nominal width of sash: 2 inches.
 3. Snap-in glazing beads.
 4. Weep holes in sill.
- B. Corners mitered, fit rigid and weather-tight:
1. Mechanically fastened or welded.
 2. Sealed.

PART 3 - EXECUTION

3.01 ERECTION

- A. Install window framing, sash, sill and hardware in accordance with manufacturer's instructions.
- B. Set all windows straight, plumb and level.
- C. Securely anchor frames to surrounding construction.
- D. Use shims as required.
- E. Caulk perimeter after all lime, mortar, plaster and other corrosive materials have been removed from aluminum surface with solvents not harmful to finish. Provide backer rods as required.

3.02 PROTECTION

- A. Protect windows from damage until substantial completion.

SUBMITTAL CHECKLIST

- 1. Shop Drawings.
- 2. Manufacturer's Data.
- 3. Warranty.

END OF SECTION 08520

SECTION 08710 - FINISH HARDWARE

PART 1 – GENERAL

1.01 WORK INCLUDED

Furnish labor, materials, equipment, special tools, supervision and services required to complete all Finish Hardware work as indicated, noted, detailed, and scheduled on the Drawings and specified herein.

1.02 OWNER VERIFICATION AND REVIEW MEETING

Contractor and hardware supplier are required to meet with the Owner to review and verify the hardware schedule and sets per door. Contractor and supplier shall be responsible for verifying door and hardware handings, lockset operations, and keying required. All information, except for keying, shall be included in the submittals prior to being forwarded to the Architect.

1.03 KEYING MEETING

Contractor and hardware supplier are required to meet with the Owner to review and verify all requirements for keys and keying per door. Incorporate and coordinate all locking hardware in the Project to provide for a complete and unified system of keying. A complete keying schedule shall be submitted to the Architect and Owner, for approval, within seven days after the meeting. Determine cylinders and cores required to match or be compatible with any existing master keying systems per the Owner's requirements.

1.04 RELATED WORK SPECIFIED ELSEWHERE

Section 01400 - Quality Control
Section 03300 - Cast-in-Place Concrete
Section 04220 - Concrete Unit Masonry
Section 06100 - Rough Carpentry
Section 07900 - Joint Sealers
Section 08110 - Steel Doors and Frames
Section 08410 - Aluminum Entrances and Storefronts
Section 08800 - Glass and Glazing
Section 09900 - Painting
Section 13850 - Fire Detection and Alarm System
Division 16: Electrical components, connections, and coordination
Section 17130 - Horizontal Cabling.
Section 17920 - Access Control System
Electrical & Technology Drawings

1.05 QUALITY ASSURANCE

A. Hardware Supplier:

1. An established firm dealing in architectural commercial door hardware, with an office, sample room, warehousing facilities and an adequate inventory.
2. Has demonstrated a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project.
3. Supplier must have, as an employee, an experienced and certified Architectural Hardware Consultant (AHC), who is available to Owner, Architect, and Contractor, for consultation throughout the course of the Work.
4. Provide a competent technician to service the hardware on the job as may be required.
5. A regular franchised distributor for all materials required for this project.
6. Shall replace damaged or defective materials prior to shipment to the site. Repairs not acceptable.
7. Shall meet with the Owner to review and verify all requirements and keying required.
8. Shall conduct a comprehensive training class for the Owner's maintenance personnel prior to date of acceptance on all special application mechanical hardware provided under this Section.

- B. All work to comply with the latest requirements of ADA, ICC/ANSI A117.1, and the accessibility chapter of the Building Code.
- C. All work to comply with the latest requirements of NFPA 80, NFPA 101 and NFPA 252 in providing hardware for all fire rated openings.

1.06 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI A117.1, Providing Accessibility and Usability for Physically Handicapped People.
 - 2. ANSI/BHMA A156.1, Butts and Hinges.
 - 3. ANSI/BHMA A156.3, Exit Devices.
 - 4. ANSI/BHMA A156.4, Door Controls-Closers.
 - 5. ANSI/BHMA A156.6, Architectural Door Trim.
 - 6. ANSI/BHMA A156.7, Template Hinge Dimensions.
 - 7. ANSI/BHMA A156.13, Locks & Latches, Mortise.
 - 8. ANSI/BHMA A156.16, Auxiliary Hardware.
 - 9. ANSI/BHMA A156.18, Materials and Finishes.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM-E2074-2001 Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies.
- C. Code of Federal Regulations (CFR) Americans with Disabilities Act (ADA):
 - 1. Latest version as adopted, approved and accepted by the State.
- D. Door and Hardware Institute (DHI):
 - 1. Keying Systems and Nomenclature.
 - 2. Hardware for Labeled Fire Doors.
 - 3. Sequence and Format for the Hardware Schedule.
 - 4. Abbreviations and Symbols.
- E. National Fire Protection Association (NFPA):
 - 1. NFPA 80 Standard for Fire Doors and Windows.
 - 2. NFPA 101 Life Safety Code.
 - 3. NFPA 105 Recommended Practice for the Installation of Smoke-Control Door Assemblies.
 - 4. NFPA 252 Standard Methods of Fire Tests of Door Assemblies.
- F. Steel Door Institute (SDI):
 - 1. SDI 100 Recommended Specifications for Standard Steel Doors and Frames.
- G. Underwriter's Laboratories, Inc. (UL) - UL Standards for Safety:
 - 1. UL 10C-97 Positive Pressure Fire Tests of Door Assemblies.
 - 2. UL 228 Door Closer-Holders, With or Without Integral Smoke Detectors.
 - 3. UL 305 Panic Hardware.

1.07 SUBMITTALS

- A. Hardware Schedule:
 - 1. Submit a completely detailed schedule of finish hardware in "Vertical Format" per the Door and Hardware Institute's Sequence and Format. Include a complete typewritten schedule indicating every item required for each door or opening. Schedules to include, but are not limited to; the manufacturers, model numbers, materials, types, styles, sizes, handings, finishes, etc.

2. Numbering of hardware sets is to match those as indicated in the Specifications and as noted on the Door Schedule on the Drawings. Cross reference plans and schedules.
3. Include all prep of doors and frames required for hardware, including mounting heights, locations and dimensions.
4. Clearly indicate door sets altered from that specified.

B. Owner Verification and Review Meeting:

1. Submit with submittals, confirmation that the meeting was conducted with the Owner.
2. Include list of those present at the meeting.
3. Itemize all items resulting from discussions of the meeting in a "meeting minutes" format.
4. Review of set functions shall be done on a "per door" basis, and not merely by sets. Sets included herein is for the convenience of review by grouping like conditions and not intended to necessarily be representative of same function for all doors in the set. Verify with Owner.

C. Manufacturer's Product Information:

1. Furnish catalog cutsheets, drawings, and other descriptive data on all hardware items.
2. After final approval of the hardware by the Architect, furnish copies of submittals to door and frame suppliers and any other subcontractors and suppliers necessary for coordination and installation of door hardware complete.

D. Samples:

1. If requested by the Architect, submit one (1) sample of each different item of hardware for approval, accompanied by an itemized list showing where the different items are to be used, the manufacturer's number, the finish, sizes applicable, and the number required.
2. Submit a full sample ring of hardware finishes for all manufacturers included.
3. After review, the samples will be returned to the supplier.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver hardware or templates, or both to factory or to building as required by those furnishing items to which hardware is to be applied.
- B. Mark packages or hardware so locations of use may be identified without breaking packages.
- C. Deliver work so all work will progress without delay or interruption.
- D. The Contractor is responsible for providing adequate locked storage space for the scheduled quantities of hardware when delivered to the job.

1.09 PROJECT CONDITIONS

- A. The hardware supplier is responsible to examine the door and frame drawings and elevations to determine the suitability of hardware specified.
- B. It will be this supplier's responsibility to furnish the correct hardware to fit the door and frame conditions as indicated for correct and proper operation.

1.10 WARRANTY

- A. Furnish manufacturer's limited warranty covering defects in materials and workmanship for periods indicated as follows:
 1. Door Closers: Minimum Ten (10) years.
 2. Locksets: Minimum Ten (10) years.
 3. Exit Devices: Minimum Five (5) years.
 4. All Other Hardware: Minimum One (1) year.

PART 2 - PRODUCTS

2.01 KEYING AND KEYS

- A. Key system must be a patented keyway.
- B. Key, master key and grandmaster key to Owner's requirements.
The key schedule will be developed by hardware supplier in cooperation with Owner's representative.
- C. Provide six (6) grandmaster keys, six (6) master keys per group, and two (2) keys per lock.
- D. Engrave all keys with the words **UNLAWFUL TO DUPLICATE THIS KEY**.

2.02 LOCKS, LATCHES AND CYLINDERS

- A. All cylinders must be factory keyed.
Provide certification from lock manufacturer stating cylinders have been factory keyed.
- B. All cylinders to have removable cores.
- C. Provide construction cores on all doors as required.
- D. Hardware supplier must be an authorized stocking distributor of the lock they propose to furnish.
- E. Provide a cylinder for every lock requiring one, whether specifically specified or not.
- F. Unless specifically indicated otherwise, all cylinders supplied throughout the entire project are to be capable of being keyed from the same master keying system. Key cylinders in dogged panic devices, keyed removable mullions, coiling doors, overhead doors, etc. to match building master keying system.

2.03 FINISHES

- A. All finishes, typical, are to be:
Satin Chrome US26D (652 Plated Steel, 626 Plated Brass) unless otherwise indicated.
Materials unable to have this finish applied are to have a finish to closely match and compliment (aluminum, dulled chrome, clear satin anodized, satin stainless steel, mil, painted, etc.).
- B. All finishes at clear anodized doors to be:
Satin Chrome US26D (652 Plated Steel, 626 Plated Brass) unless otherwise indicated.
Materials unable to have this finish applied are to have a finish to closely match and compliment (aluminum, dulled chrome, clear satin anodized, satin stainless steel, mil, painted, etc.).
- C. Contact Architect during bidding for any clarifications or concerns for finishes to be provided.

2.04 HARDWARE SETS

- A. Verification:
 - 1. The following schedule is intended to describe, in general, the types and quantities of hardware required for the various types of doors and for the other parts of the building which will require hardware. Do not consider this schedule as entirely inclusive.
 - 2. Hardware supplier is responsible for visiting the jobsite and reviewing the requirements for each installation. The supplier shall be responsible for providing all hardware as required to serve the door's intended purpose and intent, and include all costs for such in their bid.
 - 3. Hardware supplier is responsible for coordination of all hardware items used together in conjunction with one another, mounting as required to coordinate with all doors and frames as designed, and include all costs for such in their bid.

4. Hardware supplier is responsible for conducting the Owner Verification and Review Meeting, incorporating all items into submittals, and include all costs for such in their bid.
5. Hardware supplier is responsible for conducting the Owner Keying Meeting, determining cylinders and cores required to match any existing building master keying system, provide and install compatible items and key per Owner's requirements.

B. General Requirements:

1. Provide all fire and smoke seals and gaskets as required per Code for all rated door assemblies and for all smoke partition assemblies; full perimeter at head, jambs and bottom.
2. Provide glass and materials as required to meet and maintain fire ratings for all assemblies.
3. All items as listed in hardware sets are "per door", unless otherwise indicated.
4. All hardware to be mounted per ADA and ICC/ANSI A117.1.

2.05 HARDWARE PRODUCTS

A. Acceptable Manufacturers:

<u>Hardware Item</u>	<u>Manufacturer</u>
Hinges:	Ives, Hager, McKinney, Stanley, Bommer
Locksets (Cylindrical):	Schlage, Falcon, Best, Sargent, Hager, Dorma, Yale
Deadbolts:	Schlage, Falcon, Best, Sargent, Hager, Dorma, Yale
Cylinders:	Match Existing "Sargent" Keyway (Building Master Key System)
Panic Devices:	Von Duprin, Precision (PHI), Hager
Surface Closers:	LCN, Sargent, Hager
Wall/Floor Stops:	Ives, Glynn-Johnson, Hager, Rockwood, Trimco
Thresholds:	Hager, NGP, Pemko, Reese, Zero
Seals/Gaskets/Sweeps/Bottoms:	Hager, NGP, Pemko, Reese, Zero
Coordinators:	Ives, Hager, Rockwood, Trimco
Plates:	Ives, Hager, Rockwood, Trimco
Silencers:	Ives, Hager, Rockwood, Trimco
Automatic Door Bottoms:	Hager, NGP, Pemko, Reese
Position Switches:	Schlage, Securitron

B. Hinges:

1. All interior standard hinges shall be one of the following:
 - a. Ives, 5BB1WT, steel hinge and pin.
 - b. Hager, BB1168, steel hinge and pin.
2. All continuous hinges shall be one of the following:
 - a. Ives, 700, stainless steel.
 - b. Hager Roton, 790-900, stainless steel.

3. Interior and standard hinges shall be 5 knuckle, ball bearing, heavy weight, full mortise, wide throw template type hinges with flush barrel and non-removable pins.
 4. All exterior hinges shall be of non-corrosive metals, stainless steel, brass, or aluminum as specified, and appropriate for finishes required. Painted or galvanized steel is not permitted. Hinges on all exterior entry doors and all doors receiving panic hardware shall be continuous hinge type and configuration, full height of door.
 5. All interior standard hinges shall be capable of 180 degree throw. Use wide throw hinges where necessary to clear jamb trim. Provide same material and finish as standard hinges such that all hinges match for like use and applications.
 6. All continuous hinges at access control doors are to be provided with electric power transfer prep, located and sized as required to coordinate with devices, equipment, and wiring needs.
 7. Except where label provisions require larger or heavier hinges or where specified otherwise:
 - a. Provide 1-1/2 pairs of hinges for each door up to 7'-6".
- C. Locksets (Cylindrical):
1. All heavy-duty Grade 1 cylindrical locksets shall be one of the following:
 - a. Schlage, ND Series, "Rhodes" lever and escutcheon.
 - b. Falcon, T Series, "Dane" lever and escutcheon.
 - c. Best, 9K Series, "15" lever and "D" escutcheon.
 - d. Sargent, 11 Line TZONE Series, "L" lever and escutcheon.
 - e. Sargent, 10 Line Series, "L" lever and escutcheon.
 - f. Hager, 3400 Series, "Withnell" lever and escutcheon.
 - g. Dorma, CL800 Series, "LR" lever and escutcheon.
 - h. Yale, 4700(LN) Series, "Augusta AU" lever and escutcheon.
 - i. Stanley, QCL 100 Series, "Sierra E" lever and escutcheon.
 2. All locksets shall have 2-3/4" backset with appropriate standard strike package.
 3. All classrooms shall be equipped with latch having a dead latching pin. Function shall provide for anti-intruder capabilities which enable the doors to be closed and locked from the inside of the room, allow egress from the inside without the use of a key, and remain locked upon re-closing without relocking by key. No deadbolt is permitted.
Function equal to:
 - a. "Schlage" L9071, Classroom Security Lock.
 - b. "Sargent" 38, Classroom Security Lock.
 4. All other conditions, function and operation as selected by Owner from all manufacturer's available.
- D. Panic Devices (Rim Type):
1. All panics shall be one of the following:
 - a. Von Duprin, 99 Series, "06" lever design.
 - b. Stanley (PHI), Apex 2100 Series, "A" lever design.
 2. Provide Lever Trim with ANSI Function "08" on exterior of all devices, unless indicated otherwise. Only compression springs shall be used in devices, latches and outside trim and/or controls.
 3. Where Door Pulls are scheduled, provide Ives 8190, 90 degree offset pull.
12" center-to-center x 1" diameter x 3-1/4" projection, concealed mounting, brass.
 4. All exterior doors to receive locking cylinders with night latch function, unless indicated otherwise.
 5. Do NOT provide cylinder dogging devices, unless specifically indicated otherwise.
 6. Provide cylinders for all panic devices to be compatible for brand of locksets provided and/or for building's master keying system.
 7. Provide fire rated devices for all rated door assemblies.
 8. Exterior panic doors to have universal function, adjustable in the field for operation as desired.

9. All classrooms shall be equipped with anti-intruder capabilities which enable the doors to be closed and locked from the inside of the room, allow egress from the inside without the use of a key, and remain locked upon re-closing without relocking by key. Provide Double Cylinder and Lever Trim. No dogging permitted.
10. All other conditions, function and operation as selected by Owner from all manufacturer's available.
11. Exit devices shall be tested to ANSI/BHMA A156.3 test requirements by a BHMA certified laboratory. A written certification showing successful completion of a minimum of 1,000,000 cycles shall be provided upon request.
12. Touch pad shall extend a minimum of one half of the door width. Maximum unlatching force shall not exceed 15 pounds. End cap will have three-point attachment to the door.
13. Provide roller strikes for all rim and surface-mounted vertical rod devices, ASA strikes for mortise devices, and manufacturer's standard strikes for concealed vertical rod devices.
14. All devices to incorporate a security dead-latching feature.
15. Provide removable mullion for any pair of doors where panic devices are used, whether scheduled or not. Prep frames as required.

E. Electrified Panic Devices:

1. All electrified panics shall be one of the following (to match series of all others specified):
 - a. Von Duprin, 99 Series, "06" lever design.
 - b. Stanley (PHI), Apex 2100 Series, "A" lever design.
2. Provide equal to Von Duprin EL Electric Latch Retraction option to allow for a control station actuator (key switch, credential reader, etc.) to remotely unlatch and retract the latch bolt.
3. Provide SD-EL Special Center Case Dogging for cylinder dogging capability.
4. Provide cylinders for all panic devices to be compatible for brand of locksets provided and/or for building's master keying system.
5. Provide equal to Von Duprin EPT-2 Power Transfer.
6. Provide equal to Von Duprin PS914 Power Supply.
Provide equal to Von Duprin 900-2RS option for 2 relay EL panic device control board.
Provide equal to Von Duprin 900-BB option for battery backup.
Provide equal to Von Duprin 900-FA option for input of a normally closed fire alarm contact to the fire alarm system.
7. Provide equal to Von Duprin E996L electrified Lever Trim with cylinder operation for night latch function on all devices, unless indicated otherwise.
8. Where Door Pulls are scheduled, provide Ives 8190, 90 degree offset pull.
12" center-to-center x 1" diameter x 3-1/4" projection, concealed mounting, brass.
9. Field convertible between Fail-Safe and Fail-Secure.
Upon loss of power, the panic device and trim shall fail to Fail Secure condition so that the door remains in a locked position to maintain security to the building and spaces.
10. In retrofit or renovation work, provide cover plate kit to cover cutouts required by existing exit device installations consisting of inside and outside plates for hinge stile cutouts, an inside plate for the lock stile, and all necessary hardware.

F. Surface Closers:

1. Push side condition (with parallel arm) shall be one of the following:
 - a. LCN, 4110 Series (4111 cylinder).
 - b. Sargent, 281 Series.
 - c. Hager, 5100 Series.
2. Pull side condition (with non-parallel arm) shall be one of the following:
 - a. LCN, 4040 Series (4041 cylinder).
 - b. Sargent, 281 Series.
 - c. Hager, 5100 Series.

3. Provide reduced force ADA cylinder.
 4. Door closers shall be hydraulic, full rack and pinion action with a high strength cast iron cylinder. Cylinder body shall be 1-1/2" diameter, and double heat-treated pinion shall be 11/16" diameter. A written certification showing successful completion of a minimum of 1,000,000 cycles shall be provided upon request.
 5. All closers shall have forged steel main arms and forearms.
 6. Mounting shall be on the inside face of the door, interior to the room. Closers shall not be seen on the corridor, hallway or public side of the door.
 7. All covers shall be metal.
 8. All finishes shall be powder coat aluminum.
 9. Provide hold open functions where specified. All hold opens to be adjustable to 180 degrees.
 10. In all cases, the manufacturer's recommended table of sizes is to govern the size of closers.
 11. Use through-bolts to fasten surface closers to mineral core wood and hollow metal doors.
 12. Provide arms, corner brackets, mounting brackets, or drop plates as required.
 13. Provide 180° door swing wherever possible.
 14. Reduced force opening of less than 5 lbs. of force for interior hinged doors per ADA.
 15. Closing speed of sweep period shall be adjusted so that from an open position of 70 degrees the door will take at least 3 seconds to move to a point 3 inches from the latch per ADA.
- G. Wall/Floor Stops:
1. All wall stops shall be one of the following:
 - a. Ives, WS401CCV, brass.
 - b. Hager, 236W, brass.
 2. All floor stops shall be one of the following:
 - a. Ives, FS436; FS438 if high stop condition is required, brass.
 - b. Hager, 241F; 243F if high stop condition is required, brass.
 3. All heavy-duty floor stops shall be one of the following:
 - a. Ives, FS18S, steel stud grouted in concrete.
 - b. Hager, 269F, steel stud grouted in concrete.
 4. Provide stops or bumpers wherever an opened door strikes any part of building construction, whether indicated or not. In general, provide wall mounted stops for all doors.
 5. Furnish floor dome type where wall type cannot be used.
 6. Furnish heavy-duty floor stops at all exterior entry and panic doors, whether indicated or not.
- H. Thresholds:
1. Aluminum, saddle-type.
 2. Fully ADA compliant.
 3. Span entire width and depth of opening.
 4. 1/2" maximum height.
 5. 1:2 ratio bevel slope.
 6. Finish to match all other hardware specified for opening, and storefront units where applicable.
- I. Seals/Gaskets/Sweeps/Bottoms (used for Weatherstripping):
1. All bottoms for doors with recessed bottom channels shall be one of the following:
 - a. Hager, 750SN.
 2. All bottoms for doors without recessed bottom channels shall be one of the following:
 - a. Hager, 772S.
 3. All bottoms to be mil finish aluminum.
 4. Provide bottoms on all exterior doors, whether scheduled or not.
 5. Weatherstripping to be Vinyl, Neoprene, EPDM, TPE (thermoplastic elastomer), or Silicone.
 6. Full length and width of opening at each condition.

7. All weatherstripping sets shall be determined by the door hardware supplier as appropriate to the application and able to provide a weather-tight and weather-proof seal, while allowing proper operation of the door and all other hardware.
 8. Provide weatherstripping seal sets at entire perimeter jambs and head of all exterior doors, whether scheduled or not.
- J. Seals/Gaskets (used for Sound Seals):
1. All sound seals shall be one of the following:
 - a. Pemko, S88 Series.
 2. Silicone, adhesive-backed, with compression bulb and stabilizer flange.
 3. Full length and width of opening at each condition.
 4. Provide sound seal sets at entire perimeter jambs and head.
- K. Seals/Gaskets (used for Fire and Smoke Seals):
1. All fire and smoke seals shall be one of the following:
 - a. Pemko, HSS2000 Series.
 2. High temperature silicone, self-extinguishing and non-toxic.
 3. Full length and width of opening at each condition.
 4. Provide fire and smoke seal sets at entire perimeter jambs and head as required.
- L. Plates:
1. All kick plates shall be height=8", length=2" less than door, unless otherwise indicated, and one of the following:
 - a. Ives, 8400.
 - b. Hager, 194S.
 2. All plates to be .050" thick minimum, brass, stainless steel, or aluminum.
 3. All plates to have beveled edges on all 4 sides.
 4. All plates to have countersunk screws.
 5. Screw-fasten solid to door.
- M. Automatic Door Bottoms:
1. All automatic door bottoms shall be one of the following:
 - a. Hager, 730S.
 - b. NGP, 422.
 - c. Pemko, 411ARL.
 - d. Reese 521C.
 2. Non-handed, reversible, full mortise, flush mounting.
 3. Comprised of an aluminum case surrounding a movable drop-bar seal. The drop-bar seal is actuated by a plunger which contacts the jamb as the door closes, forcing the drop-bar seal down against the floor or threshold surface.
 4. Mill aluminum finish with black sponge neoprene insert.
 5. Provide appropriate type of unit applicable to each door material and thickness.
- N. Silencers:
1. All door silencers in metal frames shall be one of the following:
 - a. Ives, SR64.
 - b. Hager, 307D.
 2. All door silencers in wood frames shall be one of the following:
 - a. Ives, SR65.
 - b. Hager, 308D.
 3. Furnish silencers for all interior single doors, whether scheduled or not.

4. Omit silencers at doors where they may interfere with other types of seals already required, such as fire rated doors, smoke doors, sound proof doors, or light proof doors.

O. Position Switches:

1. All position switches for wood doors in wood frames shall be one of the following:
 - a. Schlage, 679-05.
 - b. Securitron, DPS-W.
2. All position switches for hollow metal doors in hollow metal frames shall be one of the following:
 - a. Schlage, 679-05 HM.
 - b. Securitron, DPS-M.
3. All position switches for wood doors in hollow metal frames shall be one of the following:
 - a. Schlage, 679-05 WD.
4. All position switches for aluminum doors in aluminum frames shall be one of the following:
 - a. Schlage, 7764.
5. Monitor the position status of door.
6. Concealed switches, flush-mounted in top of door and head of frame, directly opposite one another.
7. Magnetic switch and a permanent magnet, normally closed.
8. Finish as selected by Architect.

P. Access Control Door Controllers:

1. Specified in Section 17920 - Access Control System.

Q. Access Control Credential Readers:

1. Specified in Section 17920 - Access Control System.

R. Access Control Remote Entry and Camera System:

1. Specified in Section 17920 - Access Control System.

2.06 HARDWARE SCHEDULE

Hardware Set #1 (Doors 101A, 108B, 110A)

Continuous Hinges

Electrified Panic Device (Door Pull) (Night Latch function) (Cylinder)

Surface Closers

Threshold (entire opening)

Weatherstripping

Bottoms

Position Switch

Power Supply

Access Control Panel (See Section 17920)

Access Control Credential Reader (See Section 17920)

**See Door Access Riser Diagrams*

Hardware Set #2 (Door 101B)

Continuous Hinges (both leafs)
Electrified Panic Device (one leaf) (Door Pull) (Night Latch function) (Cylinder)
Rim Panic Device
Surface Closers (both leafs)
Threshold (entire opening)
Weatherstripping (both leafs)
Bottoms (both leafs)
Position Switches (both leafs)
Power Supply
Access Control Panel (See Section 17920)
Access Control Credential Reader (See Section 17920)

**See Door Access Riser Diagrams*

Hardware Set #3 (Doors 102A, 102B, 109A, 109B)

Hinges
Lockset (Anti-Intruder function)
Surface Closer
Automatic Bottom
Smoke Seals

Hardware Set #4 (Doors 108A)

Hinges
Panic (Anti-Intruder function)
Surface Closer
Automatic Bottom
Smoke Seals

Hardware Set #5 (Doors 102C, 112)

Hinges
Lockset (Anti-Intruder function)
Surface Closure

Hardware Set #6 (Door 104)

Hinges
Lockset (Storeroom Function)

Hardware Set #7 (Doors 105, 106, 107, 115)

Hinges
Lockset (Storeroom Function)
Surface Closure

Hardware Set #8 (Doors 103A, 103B, 103C)

Hinges
Lockset (Office Function)
Surface Closer
Sound Seal
Automatic Door Bottom

Hardware Set #9 (Doors 110B)

Continuous Hinges
Closer
Electrified Panic Device (Door Pull) (Night Latch function) (Cylinder)
Wall Stop
Position Switch
Power Supply
Access Control Panel (See Section 17920)
Access Control Credential Reader (See Section 17920)
**See Door Access Riser Diagrams*

Hardware Set #10 (Doors 114, 115)

Hinges
Lockset (Passage Function)
Surface Closure
Wall Stop

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install finishing hardware as recommended by the National Builders Hardware Association.
- B. Only use fasteners supplied by the manufacturer. Provide fasteners of suitable size, quantity, type and finish to secure hardware in position for heavy use and long life.
- C. Hardware for application on metal surfaces:
 1. Made to standard templates.
 2. Fastening harmonized with hardware as to material and finish.
 3. Fastenings with approved type anchors according to the manufacturer.
 4. In general, ends of through-bolts shall be countersunk.
- D. Mount hardware in accordance with current state and federal accessibility standards and guidelines.
- E. Install hardware per manufacturers instructions and in compliance with:
 1. NFPA-80.
 2. NFPA-101.
 3. NFPA-105.
 4. NFPA-252.
 5. ANSI A117.1.
- F. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.
- G. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- H. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

- I. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Division 7 Section "Joint Sealers".
- J. Weatherstripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.02 FIELD QUALITY CONTROL

- A. Material supplier to inspect hardware after installation and before final acceptance in order to ensure that hardware has been properly installed. If there are any discrepancies the material supplier is to provide the Architect, General Contractor and Installer with a written report detailing any and all discrepancies. All discrepancies are to be corrected prior to final acceptance unless otherwise directed by the Owner.

3.03 ADJUSTING AND CLEANING

- A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit.
- B. Immediately prior to Substantial Completion replace all construction cores.
- C. Tag all keys.
- D. Check each key and each lockset to verify proper working order.
- E. Lubricate and adjust all hardware to provide smooth operation.
- F. Clean all hardware per manufacturer's instructions after installer makes final adjustments and prior to final acceptance, remove all mortar, drywall mud, paint overspray, foreign materials, labels, markings, soil, oils, etc. Polish all locksets, plates, and other hardware.
- G. Clean adjacent surfaces soiled by hardware installation
- H. Replace, at no cost to Owner, items that cannot be cleaned to manufacturer's level of new finish quality or that cannot be adjusted to operate freely and smoothly or as intended for the application made.
- I. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to function properly with final operation of heating and ventilating equipment.

SUBMITTAL CHECKLIST

- 1. Hardware Schedule.
- 2. Owner Verification and Review Meeting.
- 3. Manufacturer's Product Information.
- 4. Samples.

END OF SECTION 08710

SECTION 08800 - GLASS AND GLAZING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Glass and glazing as shown on the Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 06200 - Finish Carpentry
Section 08110 - Steel Doors and Frames
Section 08410 - Aluminum Entrances and Storefronts
Section 08520 - Aluminum Windows

1.03 QUALITY ASSURANCE

- A. Comply with the following:
1. Glazing Material:
 - a. FS DD-G-451D.
 - b. ANSI Z97.1.
 2. Safety Glazing:
 - a. FS DD-G-1403C.
 - b. ANSI Z97.1.
 - c. ANSI Z97.1q.
 - d. U.S. Consumer Product Safety Commission Standard 16 CFR 1201 C1 and C2.
 3. Insulating Glass:
 - a. Manufacturing: ASTM E 6 P03, Class CBA.
 - b. Installation: SIGMA A-3000.
- B. Unless otherwise shown or governed by other reference standards specified, conform with details and procedures of FGMA Glazing Manual.

1.04 SUBMITTALS

- A. Manufacturer's Literature:
 1. Materials description and installation instructions for glazing compounds.
- B. Samples:
 1. Submit 6" x 6" actual sample of each glass type, color, tint, etc.
 2. Submit 12" x 12" actual sample of insulated units or spandrel units.
- C. Warranty: Submit specified warranty for review.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver glazing materials to project site in manufacturer's unopened containers, fully identified with trade name, color, size, hardness, type, class and grade. Store each item in accordance with manufacturer's instructions. Remove all damaged, or otherwise unsuitable material immediately from the job site.

1.06 JOB CONDITIONS

- A. Do not perform work under adverse weather or job conditions. Install liquid sealants when temperatures are within lower or middle third of temperature range recommended by manufacturer.

1.07 WARRANTY

- A. Provide manufacturer's warranty for insulated glass units against material obstruction of vision resulting from moisture infiltration or dust collection between interior glass surfaces for ten (10) years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with specifications requirements and approval of products by the Architect, manufacturers offering factory fabricated insulating glass units which may be incorporated in the work include the following:
1. "AGC Flat Glass"
 2. "Arch Aluminum & Glass Co., Inc."
 3. "Libbey-Owens-Ford Glass Company"
 4. "Louisville Plate Glass Company, Inc."
 5. "Old Castle Glass".
 6. "Pilkington North America, Inc."
 7. "PPG Industries, Inc."

2.02 GLASS TYPES

- A. Clear Float Glass:
1. Glass sheet made by floating molten glass on a bed of molten tin.
 2. Thickness as shown on Drawings or specified herein.
 3. Safety glass in all doors, windows, transoms and sidelights, where required by code and where shown on the Drawings and specified herein, whether required by Code or not.
 4. Safety glass to be laminated or tempered at all exterior units and tempered at all interior units, unless otherwise indicated.
 5. Glass to be clear.
- B. Tinted Float Glass:
1. Thickness as shown on Drawings or specified herein.
 2. All requirements of clear float glass apply as specified above, except glass lites to be tinted.
 3. Body tinted by adding colorants to normal batch of clear molten glass.
 4. Tint color to be as indicated or as selected by Architect from manufacturer's entire selection.
- C. Low-E Glass:
1. Coated to reduce transmission of radiation, infrared, and ultraviolet rays.
 2. Smooth, sputter coating. Pyrolytic coatings are not permitted.
 3. Thickness as shown on Drawings or specified herein.
 4. All requirements of clear float glass or tinted float glass apply as specified above, except glass lites to be Low-E coated and applied to surface 2 (from outside face).
 5. See Tinted Float Glass for tint color, where tinted glass is required.
 6. Provide one of the following approved products, or an approved equal:
 - a. "PPG Industries, Inc.", Solarban 60.
 - b. "Guardian", SunGuard SuperNeutral 68.
 - c. "AGC"; Energy Select 36.
- D. Laminated Safety Glass:
1. Thickness as shown on Drawings or specified herein.
 2. (2) lites of equal thickness of heat strengthened clear or tinted float glass.
 3. .030" polyvinyl interlayer.
 4. Inner lite clear. Tint outer lite if tinted glass is required.
 5. See Tinted Float Glass for tint color, where tinted glass is required.

- E. Tempered Safety Glass:
 - 1. Thickness as shown on Drawings or specified herein.
 - 2. Single thickness of clear or tinted float glass.
 - 3. Reheated to just below melting point and suddenly cooled for tempering.
 - 4. Upon major impact, the glass surface shall shatter into small pieces free of sharp points or slivers.
 - 5. See Tinted Float Glass for tint color, where tinted glass is required.

- F. 1" Insulating Glass:
 - 1. Manufacturer's standard units comprised of (1) 1/4" outdoor lite and (1) 1/4" indoor lite with an overall nominal thickness of 1".
 - 2. Complete units tested and approved in accordance with requirements of the Sealed Insulating Glass Manufacturer's Association (SIGMA).
 - 3. Outdoor Lite:
 - a. 1/4" Low-E glass, tinted, laminated or tempered safety glass.
 - b. All requirements of Low-E glass apply as specified above.
 - c. See Tinted Float Glass for tint color.
 - 4. Indoor Lite:
 - a. 1/4" clear float glass, laminated or tempered safety glass.
 - b. All requirements of laminated or tempered safety glass apply as specified above.
 - 5. Separate outdoor and indoor lites by 1/2" desiccant spacer bar.
 - 6. At least one of the outer or inner lites must be laminated safety glass.
Preferable for the exterior lite to be laminated unless coating and/or tinting prohibit it.

- G. Fire-Resistant Rated Glass:
 - 1. Fire-resistant and rated glass-ceramic with surface-applied film for use in applications with fire rating requirements.
 - 2. When required to be safety glass, provide (2) lites of equal thickness of glass laminated with an approved polyvinyl interlayer to meet and maintain the required rating performance criteria.
 - 3. Meet requirements for specific applications as required by Code, per IBC Tables 716.3 and 716.5.
 - 4. When a fire-resistant glass is required for stoppage of fire and smoke, but not required to stop the transmittance of radiant heat, and is required to be safety glass.
Provide one of the following approved products, or an approved equal:
 - a. "AGC", Schott Pyran Platinum L.

2.03 MISCELLANEOUS MATERIALS

- A. Glazing Sealant for Exterior Glazing:
 - 1. One Part Silicone, FS TT-S-00230C, Type II, Class A.
 - 2. Provide one of the following approved products:
 - a. "General Electric Company", 1200 Series.
 - b. "Dow Corning Corporation", Dow Corning Silicone Rubber Sealant.
 - c. "Tremco", Proglaze Silicone Construction Sealant.
 - d. "Pecora Chemical Corporation", 863.
 - e. "DAP, Inc.", Dap Flexiglaze 1231 Glazing Compound.

- B. Glazing Tape:
 - 1. Polyisobutylene / butyl.
 - 2. Provide one of the following approved products:
 - a. "Tremco", Tremco 440 Tape.
 - b. "Pecora Chemical Corporation", G-66.
 - c. "Pecora Chemical Corporation", BB-50.
 - d. "DAP, Inc.", Butyl Rubber Tape.

- C. Setting Blocks:
 - 1. Neoprene blocks, 80 to 90 Type A durometer hardness.
- D. Spacers:
 - 1. Neoprene blocks, 40 to 50 Type A durometer hardness, 3" long, self-adhesive on one face only.

2.04 FABRICATION

- A. Sealed Edge Construction for Insulated Units:
 - 1. Fabricate units with a permanent, hermetically sealed, dry air or gas filled space of the width indicated, between sheets of glass as indicated.
 - 2. Except as otherwise indicated, fabricate units with 1/2" wide air spaces.
 - 3. Label each unit to show compliances with required standards and regulations.
 - 4. Indicate which face of unit is for exposure to exterior of weather.
 - 5. Provide removable label except where regulations require a permanent label.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Examine all surfaces to receive the parts of the Work specified herein.
- B. Verify all dimensions of in-place and subsequent construction.
- C. Application or installation of materials constitutes acceptance of the related construction.

3.02 INSTALLATION

- A. Employ only experienced glaziers who have had previous experience with the materials and systems being applied. Use tools and equipment recommended by the glass manufacturer.
- B. Maintain a minimum temperature of 40°F during glazing unless the manufacturer of the glazing materials specifically agrees to application of his materials at lower temperatures.
- C. Clean glazing stops and rabbets to receive glazing materials of all obstructions and deleterious substances which might impair the work. Remove protective coatings which might fail in adhesion or interfere with bond of sealants. Comply with manufacturer's instructions for final wiping of surfaces immediately before application of primer and glazing compounds or tapes.
- D. Inspect each piece of glass immediately before installation. Do not install pieces which have significant impact damage at edges, scratches or abrasion of faces, or any other evidence of damage.
- E. Set glass on setting blocks or shims. Use blocks of proper size and spacing to support the glass in accordance with manufacturer's recommendations.
- F. Provide spacers for all glass to separate glass from stops, except where continuous gaskets or tape are required.
- G. Set glass in a manner which produces greatest possible degree of uniformity in appearance.
- H. Install glass according to manufacturer's recommendations and in accordance with the Flat Glass Marketing Association Glazing Manual.

- I. Clean excess sealant or compound from glass and framing members immediately after application, using solvents or cleaners recommended by manufacturers.

3.03 CURING, PROTECTION AND CLEANING

- A. Cure sealants in accordance with the manufacturer's instructions to attain maximum durability and adhesion to glass and framing as soon as possible.
- B. Remove and replace glass which is broken, cracked, chipped or damaged, in any way and from any source, including weather, vandalism and accidents during the construction period.
- C. Maintain glass in a reasonably clean condition during construction so that it will not become stained and will not contribute to the deterioration of glazing materials.
- D. Remove labels, clean and polish glass on both faces prior to final inspection. Comply with instructions and recommendations of the glass manufacturer and glazing materials manufacturer for cleaning in each case.

3.04 TESTING OF EXTERIOR GLAZING SYSTEMS

- A. After completion of exterior glazing and nominal curing of sealants, perpendicularly from a 3/4" hose at normal domestic water pressure, test each exterior glazing unit. Repair leaks and other defects, and retest as directed. Repair or replace other work damaged by such leaks.

SUBMITTAL CHECKLIST

1. Manufacturer's Literature.
2. Samples.
3. Warranty.

END OF SECTION 08800

SECTION 08950 - INSULATED TRANSLUCENT WINDOW SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

- A. All requirements of the contract documents form an integral part of the work specified herein; in particular, refer to the conditions (general or otherwise) and Division 1 of the specifications, including all subdivisions thereof.
- B. Insulated windows shall consist of 2-3/4" thick flat factory prefabricated sandwich panels and systems, and all related accessories necessary for a complete and finished installation.
- C. Requests for substitutions must be approved in writing or by addendum no later than ten (10) days prior to bid due dates and in keeping with Division 1 (Substitutions) of the specifications.
- D. Work included: Supply all material (and labor) required to deliver (and install) the insulated window system. The following major items included are:
 - 1. Prefabricated insulated translucent window sandwich panels installed as window units.
 - 2. Aluminum installation system.
- E. Related Work Specified Elsewhere:
 - Structural Steel – Section 05100
 - Rough Carpentry – Section 06100
 - Flashing, Sheet Metal and Roof Accessories – Section 07600

1.02 QUALITY ASSURANCE

- A. Manufacturer's and Erector's Qualifications.
 - 1. Window system must be listed by the International Conference of Building Officials, which requires quality control inspections and, fire, structural and water infiltration testing of sandwich panel systems by an approved agency.
 - 2. Quality control inspections and required testing shall be conducted at least once each year and shall include manufacturing facilities, sandwich panel components and production sandwich panels for conformance with "Acceptance Criteria for Sandwich Panels" as regulated by the ICBO-ES.
 - 3. Material and products shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least ten (10) consecutive years and which can show evidence of those materials being satisfactorily used on at least six (6) projects of similar size, scope and location within such a period. At least three (3) of the projects shall have been in successful use for ten (10) years or longer.
 - 4. Erection shall be by an installer, which has been in the business of erecting specified materials for at least five (5) consecutive years and can show evidence of satisfactory completion of projects of similar size, scope and type.
- B. Performance Requirements: The manufacturer shall be responsible for the configuration and fabrication of the complete window panel system.

1.03 SUBMITTALS

- A. Submit shop drawings and color samples in accordance with Division 1, Submittals.
- B. Test reports to be furnished by window system manufacturer in accordance with Division I, Submittals. The manufacturer shall submit certified test reports made by an independent testing organization for each type and class of panel system. Reports shall verify that the material will meet all performance requirements of this specification. Previously completed test reports will be acceptable if for current manufacturer and indicative of products used on this project. Test reports required are:
 - 1. Flame Spread and Smoke Developed (ASTM E-84 by UL 723) – Submit UL Card
 - 2. Burn Extent (ASTM D-635)
 - 3. Color Difference (ASTM-2244)
 - 4. Erosion Resistance (ASTM D-4060)
 - 5. Impact Strength (UL 972)
 - 6. Tensile Bond Strength (ASTM C-297) after aging by ASTM D-1037
 - 7. Shear Bond Strength (ASTM D-1002) after five (5) separate conditions
 - 8. Beam Bending Strength (ASTM E-72)
 - 9. Insulation “U” Factor (by NFRC-100: ASTM C-236, E-1423, and C-1199)
 - 10. NFRC Certification (Optional)
 - 11. Condensation Resistance Factor (AAMA 1503.1) (Optional)
 - 12. Class A Roof Covering Burning Brand (ASTM E-108)
 - 13. UL Listed Class A Roof System (UL 790) (Optional) – Submit UL Card
 - 14. Class 1 Fire Approval (FM 4471) (Optional)
- C. Proof of regular, independent quality control monitoring under a nationally recognized building code review and listing program shall be submitted.

1.04 PRODUCT HANDLING

- A. Store window panels on the long edge, several inches above the ground, blocked and under cover to prevent warping in accordance with manufacturer's storage and handling instructions.

1.05 WARRANTY

- A. Submit manufacturer's standard one-year material and workmanship warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
 - 1. Kalwall Corporation.
(800) 258-9777, (603) 627-7905 fax.
 - 2. Skywall Translucent Systems.
(502) 228-5828, (502) 228-1881 fax.
 - 3. Major Industries.
(715) 842-4616, (715) 848-3336 fax.

2.02 TRANSLUCENT FACING

- A. Translucent Faces:
Shall be manufactured from glass fiber reinforced thermoset resins specifically for architectural use. Thermoplastic (e.g. polycarbonate, acrylic) faces are not acceptable.

- B. Flammability:
The interior face sheet shall be U.L. listed and have a flamespread rating no greater than 50 (20) and smoke developed no greater than 250 (200) when tested in accordance with UL 723. Burn extent by ASTM D-635 shall be no greater than 1". Faces shall not deform, deflect or drip when subjected to fire or flame or delaminate when exposed to 300°F for 25 minutes per UBC and SBC (200°F for 30 minutes per BOCA). (Optional: faces shall conform to FM 4471).
- C. Weatherability:
1. The full thickness of the exterior face shall not change color more than 3.0 (7.0) Hunter or CIE Units DELTA E by ASTM D-2244 5 years (30 months) outdoor South Florida weathering at 5 degrees facing South, determined by the average of at least three (3) white samples with and without a protective film or coating to ensure maximum, long-term color stability. Color stability shall be unaffected by abrasion or scratching.
 2. The exterior face shall have a permanent glass erosion barrier embedded beneath the surface to provide maximum long-term resistance to reinforcing fiber exposure. Sacrificial surface films or coatings are not acceptable erosion barriers. Exterior face surface loss shall not exceed .7 mils and 40 mgs when tested in accordance with ASTM D-4060-90 employing CS17 abrasive wheels at a head load of 500 grams for 1000 cycles.
- D. Appearance:
Exterior face sheets shall be smooth, .070" thick and white in color. Interior face sheets shall be .045" thick and white in color. Faces shall not vary more than + 10% in thickness and uniform in color.
- E. Strength:
The exterior face sheet shall be uniform in strength, impenetrable by hand held pencil and repel an impact equal to 70 (230) ft. lbs. without fracture or tear when impacted by a 3-1/4" diameter, 5 lb. free-falling ball per UL 972.

2.03 GRID CORE

- A. Panels shall incorporate (thermally broken) aluminum I-beam grid core or 6063-T6 or 6005-T5 with provisions for mechanical interlocking of muntin-mullion and perimeter. Width of I-beam shall be no less than 7/16". The I-beam grid shall be machined to tolerances of not greater than + .002". (Thermal break shall be minimum 1".)
- B. Panels shall withstand 1200°F fire for minimum one (1) hour without collapse or exterior flaming.
- C. Thermally broken panels shall have minimum Condensation Resistance Factor of 80 by AAMA 1503.1 measured on the grid frame line and minimum CRF of 90 for center of grid cell.

2.04 ADHESIVE

- A. The laminate adhesive shall be heat and pressure resin-type engineered for structural sandwich panel use, with minimum 25-years field use. Adhesive shall pass testing requirements specified by the International Conference of Building Officials "Acceptance Criteria for Sandwich Panel Adhesives".

- B. Minimum tensile strength shall be 750 PSI when the panel assembly is tested by ASTM C-297 after two (2) exposures to six (6) cycles each of the aging conditions prescribed by ASTM D-1037.
- C. Minimum shear strength of the panel adhesive by ASTM D-1002 after exposure to five (5) separate conditions:
 - 1. 50% Relative Humidity at 73° F: 540 PSI
 - 2. 182° F: 100 PSI
 - 3. Accelerated Aging by ASTM D-1037 at room temperature: 800 PSI
 - 4. Accelerated Aging by ASTM D-1037 at 182° F: 250 PSI
 - 5. 500-Hour Oxygen Bomb by ASTM D-572: 1400 PSI

2.05 PANEL CONSTRUCTION

- A. Window panels shall have a thickness of 2-3/4" with a "U" factor by NFRC certified laboratory of 0.23, light transmission pf 15%.
- B. Window panels shall be a true sandwich panel of flat fiberglass sheet bonded to a grid core of mechanically interlocking (thermally broken) aluminum I-beams. Panels shall be resin laminated under a controlled process of heat and pressure, and deflect no more than 1.9" at 30 psf in 10' span without a supporting frame by ASTM E-72.
- C. Grid pattern shall be nominal 12" x 24"
- D. The adhesive bonding line shall be straight, cover the entire width of the I-beam and have a neat, sharp edge.
- E. Window panels and aluminum perimeter frame shall be pre-assembled where practical and sealed at the factory. Panels shall be shipped to the job site in rugged shipping units and shall be ready for erection.

2.06 BATTENS AND PERIMETER CLOSURE SYSTEMS

- A. Closure system shall be extruded 6063-T6 and 6063-T5 aluminum clamp-tite screw type. Curved closure system may be roll formed.
- B. Aluminum closures to be supplied with 300 series stainless steel screws (excluding final fasteners to the building) and shall be factory sealed to the panels. Aluminum battens and cap plates shall be field installed.
- C. All exposed aluminum to be (mill) (architectural corrosion resistant finish which meets the performance requirements of AAMA 2604. Color to be selected from manufacturer's standards).

2.07 FLEXIBLE SEALING TAPE

- A. Sealing tape shall be manufacturer's standard pre-applied to closure system at the factory under controlled conditions.

PART 3 - EXECUTION

3.01 PREPARATION

- A. The general contractor shall prepare openings including isolating dissimilar materials from aluminum, which may cause damage by electrolysis, and shall provide temporary enclosures if required. Provide all blocking as required for installation of units.

3.02 ERECTION

- A. The erector shall erect translucent window system in strict accordance with approved shop drawings as supplied by manufacturer. Fastening and sealing shall be in strict accordance with manufacturer's shop drawings and installation instructions. All surfaces shall be cleaned before sealants are applied.

- B. After other trades have completed work on adjacent material, carefully inspect translucent panel installation and make adjustments necessary to ensure proper installation and weather-tight conditions. All staging, lifts and hoists required for the complete insulated window installation, including staging, etc., necessary for field measuring, shall be provided by, set up, and maintained by the general contractor.

3.03 PROTECTION

- A. Protect from damage until time of final inspection

END OF SECTION 08950

SECTION 09200 - LATH AND CEMENT PLASTER

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Metal furring and lathing.
- B. Portland Cement Plastering.

1.02 QUALITY ASSURANCE

- A. Portland Cement Plastering Standards:
 - 1. ANSI A 42.4.
 - 2. ANSI A 42.3.
- B. Allowable Tolerances:
 - 1. For flat surfaces, do not exceed 1/8 inch in 8'-0" for bow or warp of surface, and for plumb or level.

1.03 SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturer's product specifications and installation instructions for each material, including other data as may be required to show compliance with these specifications.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver all manufactured materials in original unopened packages, bundles, or containers bearing manufacturer's label and brand name.
- B. Storage:
 - 1. Keep cementitious materials dry until used.
 - 2. Store off ground, under cover in a dry location.
 - 3. Protect metal goods from rusting.

1.05 JOB CONDITIONS

- A. Environmental Conditions:
 - 1. Comply with referenced standards.
- B. Protect contiguous work from soiling, spattering, moisture deterioration and other harmful effects which might result from plastering.
- C. Scaffolding:
 - 1. Construct and maintain in strict conformity with applicable laws and ordinances and in such a manner as not to interfere with or obstruct work of others.

PART 2 - PRODUCTS

2.01 METAL SUPPORT, FURRING, LATHING AND ACCESSORY MATERIALS

- A. Metals and Finishes:
 - 1. Manufacturer's standard steel products unless indicated as zinc alloy or other metal.
 - 2. Provide manufacturer's standard galvanized finish on steel products.

- B. Components:
 - 1. Hot-dip galvanized finish.
 - 2. ASTM A 525 G90 for 18 gauge and lighter formed metal products.
 - 3. ASTM A 123 galvanized after fabrication for 16 gauge and heavier products.
- C. Exposed Plastering Accessories:
 - 1. Provide zinc alloy accessories for all work.
- D. Wire Ties:
 - 1. Galvanized soft steel wire.

2.02 METAL LATHING MATERIALS

- A. Where not otherwise indicated, comply with MLSFA "Technical Bulletin 101" and ASTM C841 for selection of metal lath for each application indicated.
- B. Galvanized Diamond Mesh Lath:
 - 1. 3.4 lbs per sq. yd., diamond mesh openings (approximately 11,000 meshes per square yard), with black asphaltum paint coating.
- C. Metal Plastering Accessories and Reinforcement:
 - 1. Coordinate depth of accessory with thickness of and number of coats of plaster to be applied.
 - 2. Interior Corner Trim:
 - a. Manufacturer's standard preformed interior corner reinforcement made from 2.5 lb. per sq. yd. diamond mesh lath.
 - 3. Control Joints:
 - a. "Keene", "Insuljoint I-DV", 1/4 inch, zinc, or approved equivalent.
 - 4. Line Wire:
 - a. 18 gauge soft annealed steel wire.
 - 5. Fasteners:
 - a. Galvanized steel, of type and length suitable for adequate penetration of substrate.

2.03 PORTLAND CEMENT PLASTER MATERIALS

- A. Provide either neat or ready-mixed (where applicable) materials, at installer's option, complying with ANSI A 42.2.
- B. Base Coat Cement:
 - 1. Portland Cement, ASTM C 150, Type I or IA.
- C. Prepared Finish-Coat:
 - 1. Factory-prepared finish for Portland Cement plaster, type recommended by the manufacturer for the color and texture indicated.
- D. Texture: Smooth
- E. Finish Color: White

PART 3 - EXECUTION

3.01 PREPARATION

- A. Ceiling Anchorages:
 - 1. Coordinate work with structural ceiling work to insure that inserts and other structural anchorage provisions have been installed to receive soffit hangers.

2. Furnish inserts, steel deck hanger clip and similar devices to other trades for installation well in advance of time needed for coordination with other work.

3.02 INSTALLATION OF METAL SUPPORT SYSTEMS

A. General Isolation:

1. Where work abuts overhead structure, isolate the work from structural movement sufficiently to prevent transfer of loading into the work from the building structure. Install slip or cushion type joints to absorb deflections but maintain lateral support.
2. Frame both sides of control and expansion joints independently, and do not bridge joints with furring and lathing or accessories.

B. Metal Lathing:

1. Install metal lath to comply with referenced standards.
2. Clip lath to supports, except at location where screw-attachment of lath is indicated or required to comply with manufacturer's recommendations.

C. Plastering Accessories:

1. Anchor each flange of accessories 8 inches o.c. to plaster base.
2. Miter or cope accessory corners, and install with tight joints accurately aligned.
3. Set accessories plumb, level and true to line, with a tolerance of 1/8 inch in 10'-0".
4. Install metal corner beads at external corners.
5. Install casing beads at terminations of plaster work, except where plaster is indicated to pass through other work and be concealed by lapping work, and except where special screens, bases or frames act as casing beads.
 - a. For exterior work, set casing beads 1/4 inch (or as indicated on the drawings) from abutting frames and other work (for application of sealant).
 - b. Where plaster abuts brick, set casing bead 1/4 inch (or as indicated on the drawings) from brick.
6. Install prefabricated expansion joints of 2-piece design where shown as "Expansion Joint".

3.03 INSTALLATION OF PLASTER

- A. Mechanically mix plaster materials at the project site; do not hand mix except where small amount is needed, using less than one bag of plaster.
- B. Do not use frozen, caked or lumpy material, retempered or partially set plaster.
- C. Sequence plaster installation properly with the installation and protection of other work, so that neither will be damaged by the installation of the other.
- D. Plaster flush with metal frames and other built-in metal items and accessories which act as a plaster ground, unless otherwise shown. Where plaster is not terminated at metal by casing beads, cut base-coat free from metal before plaster sets and groove finish coat at the junctures with metal.
- E. Apply thicknesses and number of coats of plaster as indicated; or as required by referenced standards.
 1. Provide 3-coat plaster installation.
 2. Provide additional coats if required for acceptable surface.
- F. Cure Portland Cement plaster by maintaining each coat in a moist condition for 2 days following application.

3.04 CUTTING AND PATCHING

- A. Cut, patch, point-up and repair plaster as necessary to accommodate other work and to restore cracks, dents and imperfections. Repair or replace work to eliminate blisters, buckles, excessive crazing and check cracking, dry-outs efflorescence, sweat-outs and similar defects, including areas of the work which do not comply with specified tolerances, and where bond to the substrate has failed.

3.05 CLEANING AND PROTECTION

- A. Remove temporary protection and enclosure of other work. Promptly remove plaster from surfaces which are not to be plastered. Repair floors, walls and other surfaces which have been stained, marred or otherwise damaged during the plastering work. When plastering work is completed, remove unused materials, containers and equipment and clean floors of plaster debris.

- B. Protect plaster deterioration and damage during the remainder of the construction period.

SUBMITTAL CHECKLIST

1. Product Data.

END OF SECTION 09200

SECTION 09250 - GYPSUM DRYWALL – STEEL STUD CONSTRUCTION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Gypsum wallboard and gypsum drywall finish as shown on Drawings and specified herein.
- B. Fire Rated Ceiling steel stud construction as shown on Drawings and specified herein.

1.02 QUALITY ASSURANCE

- A. Gypsum wallboard construction shall comply with all laws, ordinances, rules, regulations and orders of public authorities having jurisdiction.
- B. All material shall be from a single manufacturer.
- C. Installation of steel framing members to receive gypsum wallboard shall comply with ASTM C754.

1.04 REFERENCES

- A. Comply with applicable requirements of ANSI/ASTM C 840 for application and finishing of gypsum board, unless otherwise indicated.
- B. Gypsum board terminology standard: GA-505 by Gypsum Association.

1.05 DELIVERY, STORAGE AND HANDLING

- A. All materials shall be delivered to the job in their original, unopened containers or bundles, stored in a place providing protection from damage and exposure to the elements. Remove damaged or otherwise unsuitable material from the job site.

1.06 SUBMITTALS

- A. Product Data:
Manufacturer's literature, materials description, cutsheets and recommended installation instructions for systems use.

PART 2 - PRODUCTS

2.01 GYPSUM BOARD

- A. Gypsum Board (Fire Rated Assemblies-Type X):
 - 1. Provide one of the following approved products:
 - a. "Georgia-Pacific"; Gypsum Sheathing, Type X.
 - b. "USG"; Sheetrock Gypsum Panels, Type X.
 - c. "Certaineed"; M2Tech Gypsum Board, Type X.
 - 2. Manufacture to meet specifications for FS SS-L-30, ASTM C 36 and ASTM C 1396.
 - 3. Provide in maximum lengths available to minimize end-to-end butt joints.
 - 4. Type X gypsum core gypsum board.
 - 5. Thickness: 5/8 inch.
 - 6. Width: 4 feet.
 - 7. Length: 8 feet minimum.
 - 8. Edges: Tapered.

2.02 STEEL STUDS

- A. Provide Steel Stud Systems, as approved by the Architect, by one of the following manufacturers:
1. "U.S. Gypsum Company" (USG).
 2. "National Gypsum Company".
 3. "Georgia-Pacific".
 4. "Clark Dietrich Building Systems".
 5. "Phillips Manufacturing Co."
 6. "Marino/Ware".
 7. "CEMCO Steel".
 8. "Flex-Ability Concepts".
 9. "MBA Metal Framing".
 10. "Dale/Incor".
 11. "Superior Steel Studs".
- B. System Components:
1. With each type of metal stud and joist required, provide manufacturer's standard runners (tracks), shoes, clips, ties, stiffeners, fasteners, grommets to protect electrical wiring, door jamb reinforcers and accessories as recommended by the manufacturer for the applications indicated, and as needed to provide a complete metal stud system. Where special types, conditions, or products are indicated, provide as required to match gauge, depth and section of associated wall construction.
- C. Ceiling Steel Stud Framing:
1. Manufacturer's standard formed light gauge steel studs of the length, size, and gauge indicated, with punched webs to facilitate erection of system and passage of mechanical/electrical service lines.
 2. Steel stud framing:
 - a. Gauge: minimum 20 gauge and 30 mils thickness, ASTM C645.
 - b. Depth of Section: 6 inches, unless otherwise indicated on drawings.
 - c. Flange width: Not less than 1.25 inches.
 - d. Shape: Cee shape (returned flanges).
 - e. Steel and Finish: ASTM A591, commercial quality electrolytic zinc coated steel, class B.
 - f. Face of flanges: Knurled to facilitate use of self-tapping fasteners.

2.03 MATERIALS AND COMPONENTS

- A. Fasteners:
1. Type S and S-12 screws, bugle head or pan head.
 2. Sized to provide 3/8 inch penetration beyond thickness of wallboard.

PART 3 - EXECUTION

3.01 INSTALLATION OF FRAMING AND GYPSUM BOARD

- A. Gypsum Board Fire Rated Ceilings – Metal Studs Horizontal Framing Above Acoustic Lay-in Ceiling:
1. Install framing system level and true, in accordance with manufacturer's instructions.
 2. Secure only to masonry block.
 3. Install gypsum board using fastener type and spacing of corrosion resistant buglehead drywall screws at 12 inches o.c. in field and 8 inches o.c. along edges.
- B. Joint Treatment: Tape and mud joints only

SUBMITTAL CHECKLIST

1. Product Data.

END OF SECTION 09250

SECTION 09510 - ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Extent of acoustical ceilings as shown and scheduled on the Drawings.
- B. Types of acoustical ceilings specified in this Section include the following:
 - 1. Acoustical panel ceilings, exposed grid suspension.
 - 2. Vinyl-faced gypsum board panel ceilings, exposed grid suspension.

1.02 QUALITY ASSURANCE

- A. UL Fire Hazard Classification:
 - 1. Where acoustical ceilings are indicated to comply with fire hazard classification provide acoustical materials which have been tested, rated and labeled by UL for indicated ratings.
 - 2. Classification: Maximum of 25 for flame spread.
- B. Sound and Noise Classification:
 - 1. Provide systems with NRC ratings in accordance with ASTM C423 and STC ratings in accordance with AMA1-II, as tested by an independent agency.

1.03 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's product data sheets, cutsheets, specifications and installation instructions.
- B. Samples:
 - 1. Where colors are specified, submit one sample of each type of acoustical unit and suspension system member.
 - 2. Where colors are not specified, or are specified as "to be selected", submit samples showing manufacturer's full range of standard colors for each type acoustical unit and suspension system.
 - 3. Submit additional or larger samples of selected colors upon request.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site in manufacturers original, unopened packages, with labels intact. Store and handle to avoid damage and exposure to elements. Remove damaged or otherwise unsuitable material from job site.

1.05 MAINTENANCE MATERIALS AND DATA

- A. See Specification Section 01781 - Closeout Maintenance Materials.
- B. Submit maintenance data under provisions of Section 01780 - Closeout Submittals.

1.06 PROJECT CONDITIONS

- A. Do not install acoustical ceilings until space is enclosed and weatherproof, and until wet-work in space is completed, and until temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide ceiling panels, as approved by the Architect, by one of the following manufacturers:
1. "Armstrong"
 2. "U.S. Gypsum" (USG)
 3. "Celotex"
 4. "National Gypsum Company" (NGC)
 5. "Certainteed"
- B. Provide suspension systems from same manufacturer as the ceiling panel, as approved by the Architect, or by one of the following manufacturers:
1. "Armstrong"
 2. "U.S. Gypsum/Donn Ceilings"
 3. "Chicago Metallic Corporation"

2.02 CEILING SYSTEMS

- A. Provide the following acoustical ceiling systems as indicated on the Drawings:

1. **Panel and Suspension System Type "A":**

(Lay-in, 2'x2', Drop Edge)

- a. Panel:
1. Model: "USG", Frost #440.
 2. Size: 2' x 2' x 3/4".
Edge: Square edge.
 3. NRC: 0.70.
 5. Light Reflect: 0.85.
 6. Color: White.
- b. Suspension System:
1. Model: "USG", Donn DX/DXL.
 2. Profile: 2' x 2' grid, 15/16" flange.
 3. Material: Hot dipped galvanized.
 4. Color: White.

2. **Panel and Suspension System Type "B":**

(Vinyl-Coated Gypsum Board)

- a. Panel:
1. Model: "USG", Sheetrock Lay-In Ceiling Tile Clima Plus Vinyl #3260.
"NGC", Gold Bond Gridstone Gypsum Ceiling Panels.
"Certainteed", Vinylrock X.
 2. Type: Vinyl-coated gypsum board panel.
 3. Size: 2' x 2' x 1/2".
 4. Edge: Square.
 5. Light Reflect: 0.85.
 6. Color: White.
- b. Suspension System:
1. Model: "USG", Donn DXLA.
 2. Profile: 2' x 2' grid, 15/16" flange.
 3. Material: Hot dipped galvanized, aluminum capped.
 4. Color: White.

2.03 CEILING SUSPENSION MATERIALS

- A. Comply with ASTM C 635, as applicable to type of suspension system required for type of ceiling units indicated. Coordinate with other work supported by or penetrating through ceilings, including light fixtures, and HVAC equipment.
- B. Structural Class:
 - 1. Intermediate-duty system.
- C. Attachment Devices:
 - 1. Size for 5 times design load indicated in ASTM C 635, Table 1, Direct Hung.
- D. Hanger Wires:
 - 1. Galvanized carbon steel, ASTM A 641, soft temper, pre-stretched, yield-stress load of at least 3 times design load, but not less than 12 gauge (0.106 inch).
- E. Type of System:
 - 1. Either direct-hung or indirect hung suspension system, as required to meet performance requirements.
- F. Carrying Channels:
 - 1. 1-1/2 inch steel channels, hot-rolled or cold-rolled, not less than 0.475 lbs. per lineal ft.
- G. Edge Moldings:
 - 1. Manufacturer's standard channel molding for edges and penetrations of ceiling, with single flange of molding exposed.
 - 2. 15/16 inch minimum exposed leg, finish to match grid finish.
- H. Exposed Suspension System:
 - 1. Manufacturer's standard exposed runners, cross-runners and accessories, of double web types and profiles indicated, with exposed cross runners coped to lay flush with main runners.
 - 2. Provide uniform factory-applied finish on exposed surfaces of ceiling suspension systems, including moldings, trim and accessories.
 - 3. Manufacturer's standard baked polyester finish, low gloss, color as selected.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Furnish layouts for inserts, clips or other supports required to be installed by other trades for support of acoustical ceilings.
- B. Establish layout of acoustical units in compliance with reflected ceiling plan. Balance border widths at opposite edges of each ceiling. Avoid use of less-than-half width units at borders.

3.02 INSTALLATION

- A. Install materials in accordance with manufacturer's printed instructions, and to comply with governing regulations, fire resistance rating requirements as indicated, and industry standards applicable to work.
- B. Install all acoustical units with grain in one plane and direction.

- C. Install suspension systems to comply with ASTM C 636, with hangers supported only from building structural members. Locate hangers near each end and spaced 4'-0" along each carrying channel or direct-hung runner, unless otherwise indicated, leveling to tolerance of 1/8 inch in 12'-0".
- D. Install edge moldings of type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units.
 - 1. Sealant Bed: Apply continuous ribbon of acoustical sealant, concealed on back of vertical leg before installing moldings.
 - 2. Screw-attach moldings to substrate at intervals not over 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to tolerance of 1/8 inch in 12'-0". Miter corners accurately and connect securely.
- E. Install panels in coordination with suspension system, with edges concealed by support of suspension members. Scribe and cut panels to fit accurately at borders and at penetrations.
- F. Install hold-down clips in areas indicated, and in areas where required by governing regulations or for fire resistance ratings; space as recommended by panel manufacturer, unless otherwise indicated or required.

3.03 ADJUST AND CLEAN

- A. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage.
- B. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

SUBMITTAL CHECKLIST

- 1. Product Data.
- 2. Samples.

END OF SECTION 09510

SECTION 09540 - FIBER REINFORCED PANELS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Fiberglass reinforced plastic coated panels as shown on drawings and specified herein.
 - 1. Wall Panels.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 06100 - Rough Carpentry
- Section 09250 - Gypsum Drywall

1.03 QUALITY ASSURANCE

- A. USDA accepted

- B. FM Approved and UL Classified

PART 2 - PRODUCTS

2.01 WALLS PANELS

- A. Kemlite "Fire-X Glasboard" panels.
 - 1. 4'wide x length as required to extend from floor to ceiling without seams.
 - 2. Class A (1) Flame Spread (max. 25 per ASTM E-84).
 - 3. Color: as selected from manufacturer's complete range of color selections.
 - 4. Fasteners and accessories as required for a complete installation.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install per manufacturer's recommendations.

- B. Install over masonry block wall using Kemlite Titebond FRP adhesive.

- C. Install moldings at all joints, set in silicone sealant.

3.02 CLEANING PROTECTION

- A. Clean as recommended by manufacturer.

END OF SECTION 09540

SECTION 09651 - RUBBER BASE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Section Includes:
 - 1. Rubber Base.
- B. Furnish labor, materials, equipment, special tools, supervision and services required to install the products and systems complete as shown on the Drawings and/or specified herein.

1.02 SUBMITTALS

- A. Manufacturer's Literature:
 - 1. Manufacturer's product data and descriptive literature.
 - 2. Manufacturer's installation instructions.
 - 3. Manufacturer's maintenance instructions.
 - 4. Material safety data sheets.
- B. Samples:
 - 1. Base:
 - a. Full size sections of colors as specified on drawings. Color charts alone are not acceptable.
 - b. If color is not specified, submit samples of manufacturer's entire selection.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Receive all products and materials as packaged by the manufacturer with manufacturer's seals and labels intact. Store materials at the job site within the building and in a dry place at least 48 hours before installing flooring materials.
- B. Store in space with temperature maintained between 65 degrees F and 90 degrees F.

1.04 MAINTENANCE MATERIALS AND DATA

- A. See Specification Section 01781 - Closeout Maintenance Materials.
- B. Submit maintenance data under provisions of Section 01780 - Closeout Submittals.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Rubber Base:
 - 1. FS SS-W-40A, Type I, rubber.
 - 2. 1/8" thickness, 120' rolls, coved, set-on type.
 - 3. 4" high unless otherwise shown.
 - 4. Color: as shown on Drawings.
- B. Adhesive:
 - 1. Water and alkali resistant, complying with recommendations of resilient base manufacturer.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Spaces shall be at a minimum temperature of 70 degrees F. Temperature shall be maintained during and 48 hours after installation.
- B. Surfaces shall meet the minimum requirements of the manufacturer of the base. Commencement of installation of materials constitutes acceptance of the substrates.
- C. Work shall not be started until all items penetrating the flooring and walls at locations of installation have been installed.
- D. No base shall be installed until the installer has ascertained that the chemical treatment of substrates will not interfere with the successful application of the flooring materials.
- E. When solvent-based adhesives are used, the space shall be ventilated; use spark proof fans if natural ventilation is inadequate. Prohibit all smoking.
- F. Before installing base, test wall surfaces for acceptable adhesion and bonding of new materials atop substrate. If proper adhesion and bonding are not apparent, do not install base until sealer and primer are applied.

3.02 INSTALLATION

- A. Install base and products in accordance with the manufacturer's recommendations.
- B. Mix and apply adhesive as recommended by the manufacturer. Lay base true to line, level, and with tight joints. Cut base to and around all permanent cabinets and bases.
- C. Apply 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 continuous wrapping outside corners, and miter cut inside corners. Do not use preformed corner pieces.
- D. Remove excessive adhesive in accordance with base manufacturer's instructions.
- E. After installation, maintain a minimum space temperature of 55 degrees F.

3.03 CLEANING

- A. Not less than 4 days after flooring installation, clean all base. Wash thoroughly, with a cleaner recommended by the flooring manufacturer, in accordance with flooring manufacturer's recommendations.

SUBMITTAL CHECKLIST

- 1. Manufacturer's Literature.
- 2. Samples.

END OF SECTION 09651

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Extent of painting work as indicated on the Drawings and specified herein including, but not limited to:
1. Surface Inspection and Preparation.
 2. Paint System Schedule - Exterior Paint Systems.
 3. Paint System Schedule - Interior Paint Systems.
 4. Paint System Schedule - Precast Panels Systems.
- B. Additional requirements of the work are to include:
1. Painting and finishing of all interior and exterior items and surfaces throughout the project, except as otherwise indicated. Surface preparation, priming and costs of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.
 2. Field painting of exposed steel and ironwork, and primed metal surfaces of equipment installed under mechanical and electrical, except as otherwise indicated.
 3. Field painting of all exposed interior and exterior structural steel components, whether indicated or not on the Drawings. Includes painting of galvanized components unless noted otherwise.
 4. Painting of exposed mechanical, electrical equipment items as indicated on the Drawings.
 5. Paint exposed surfaces except where natural finish of material is specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint same as adjacent similar materials or areas.
 6. "Paint" as used herein generally refers to all coating systems material, including primers, emulsions, enamels, stains, sealers, fillers, and other applied materials whether used as prime, intermediate or finish coat.

1.02 RELATED WORK

- A. Following categories of work are NOT included as part of field-applied finish work specified herein, or are included in other sections of the specifications:
1. Shop Priming:
Unless otherwise specified, shop priming of ferrous metal items is included under various sections for structural steel, miscellaneous metal, and shop-fabricated or factory-built mechanical and electrical equipment or accessories.
 2. Pre-Finished Items:
Unless otherwise indicated, do not include painting when factory-finishing or installer finishing is specified for such items including, but not limited to, pre-finished aluminum panels, finished mechanical and electrical equipment, light fixtures, switchgear, distribution cabinets, etc.
 3. Concealed Surfaces:
Unless otherwise indicated, painting is not required on surfaces in concealed areas and generally inaccessible areas, such as interstitial spaces; however, doors and door frames in these spaces shall be painted.
 4. Finished Metal Surfaces:
Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting, unless otherwise indicated.
- B. Following areas are to be included as special considerations of areas to NOT receive paint:
1. Operating parts and labels, moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, unless otherwise indicated.
 2. Any code-required labels, such as Underwriter's Laboratories and Factory Mutual, or any equipment identification, performance rating, name or nomenclature plates.

1.03 SUBMITTALS

- A. Product Data:
1. Manufacturer's published product data sheets, specifications, materials description and technical information.
 2. Manufacturer's published installation and application instructions.
 3. Materials Safety and Data Sheets (MSDS).
- B. Samples and Draw Downs:
1. If colors and finishes are indicated, submit samples boards (draw downs) for each as selected.
 2. If colors are not indicated, they will be selected by the Architect from manufacturer's entire selection. Submit complete range of available paint colors, either in the form of a fan set or individual color chips box set.
 3. If finishes are not indicated, they will be selected by the Architect from manufacturer's entire selection.
 4. Once colors and finishes have been chosen, submit samples boards for each color selected.
 5. Sample boards to be 8-1/2 inch x 11 inch cardstock, painted with actual product of color and finish as selected by the Architect. Submit three (3) of each color as selected.
 6. Stain samples to be 6 inch x 6 inch minimum on wood specifies and cut as specified. Submit three (3) of each color as selected.
- C. Mock-Ups:
1. Paint on site, a test sample area of wall, 2 foot x 2 foot minimum in size. Complete test area for each color selected, for each paint system specified, and per each substrate material included, as directed by the Architect.
 2. Paint one (1) hollow metal door and frame complete, as directed by Architect.
 3. Mock-ups shall indicate color, texture and finish.
 4. Do not proceed with paint work until mock-ups have been approved by the Architect.
 5. If deemed unacceptable by the Architect, create another mock-up to correct items of unacceptability. Continue process until an approved mock-up has been achieved.
 6. Once an approved mock-up has been achieved, use as a standard of comparison for all work.
 7. Do not destroy or remove mock-up until all paint work is complete and accepted.
 8. Accepted mock-ups may remain as part of the work or discarded, at the discretion of the Architect.
- D. Compatibility Tests:
1. Paint on site, (2) 2 foot x 2 foot minimum test sample areas of each existing and/or previously painted surface to receive new painted finish atop. Complete test area for each color selected, for each paint system specified, per each existing color of existing surface, and per each substrate material included, as directed by the Architect.
 2. Check for compatibility by applying the test sample of the recommended coating system as stated. Allow to dry for one week prior to testing adhesion per procedures of ASTM D3359.
 3. Test sample areas are to be completed by the installing contractor, reviewed and checked on site by the paint manufacturer's representative. If non-compatibility issues exist, the paint manufacturer shall provide recommendations and solutions to compatibility and/or alterations to the paint system specified.
 4. Submit all test results and manufacturer's approval in writing to the Architect. Painting manufacturer must certify that they approve the test results and will include the longevity and performance of the paint system in their warranty and guarantees of the paint system.
- E. Additional Submittals for Precast Panels
(see Paint System Schedule - Precast Panels Systems):
1. Sample boards.
 2. Certification of compatibility with joint sealants.
 3. Exterior paint system warranty.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to job site in original, new, sealed and unopened packages and containers bearing manufacturer's name and product label.
- B. Store and protect products in strict accordance with manufacturer's recommendations and requirements.
- C. Provide physical properties of each product to be used on the project, including:
 - 1. Weight per gallon.
 - 2. Solids by weight.
 - 3. Solids by volume.
 - 4. V.O.C. as supplied.
- D. Container labeling to include:
 - 1. Date of manufacture.
 - 2. Manufacturer's name.
 - 3. Product name, type and stock number.
 - 4. Color and finish.
 - 5. Rate of coverage.
 - 6. Application instructions for surface preparation, drying time, cleanup, mixing and reducing.
- E. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in well ventilated area, unless required otherwise by manufacturer's instructions.
- F. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 50 degrees F for twenty-four (24) hours before, during and forty-eight (48) hours after application of finishes, unless required otherwise by manufacturer's instructions.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 50 percent, unless required otherwise by manufacturer's instructions.
- C. Minimum Application Temperatures for Latex Paint: 50 degrees F for exterior, unless required otherwise by manufacturer's instructions.
- D. Minimum Application Temperatures for Varnish Finishes: 65 degrees F for interior and exterior, unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 foot candles measured mid-height at substrate surface.

1.06 PROJECT CONDITIONS

- A. Apply water-base paints only when temperature of surfaces to be painted and surrounding ambient air temperatures are between 60 degrees F and 85 degrees F, for at least 72 hours prior to beginning of installation, unless otherwise permitted by paint manufacturer's printed instructions.
- B. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding ambient air temperatures are between 45 degrees F and 95 degrees F, for at least 72 hours prior to beginning of installation, unless otherwise permitted by paint manufacturer's printed instructions.
- C. Maintain proper ambient air temperatures throughout entire timeframe of installation and cure period.

- D. Do not install until space is enclosed, weathertight, and ambient conditions are controlled and stabilized.
- E. Do not apply in snow, rain, fog or mist; or when relative humidity exceeds 85%; or on damp or wet surfaces.
- F. Provide adequate ventilation at all times for proper drying.

1.07 MAINTENANCE MATERIALS AND DATA

- A. See Specification Section 01781 - Closeout Maintenance Materials.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide products, as approved by the Architect, from one of the following approved manufacturers:
 - 1. "The Sherwin-Williams Company" (S-W).
 - 2. "PPG Paints" (PPG).
 - 3. "Benjamin Moore & Company" (Moore).

2.02 MATERIALS

- A. Quality:
 - 1. Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers.
 - 2. Materials not displaying manufacturer's identification as a standard, "top-of-the-line" product will not be acceptable.
- B. Compatibility:
 - 1. Provide finish coats which are compatible with prime paints used.
 - 2. Review other sections of these specifications in which prime paints or factory coats are to be provided to insure compatibility of total coatings systems for various substrates.
 - 3. Upon request from other trades, furnish information on characteristics of finish materials proposed for use, to insure compatible prime coats are used.
 - 4. Provide barrier coats over incompatible primers or remove and re-prime as required.
 - 5. Provide undercoat paint produced by same manufacturer as finish coats. Where undercoats specified are not considered by the paint manufacturer to be fully compatible with the finish coat, submit recommended undercoat substitution to Architect for acceptance. No additional cost to the Owner will be considered for such a change.
 - 6. Use only thinners approved by the paint manufacturer, and use only within recommended limits.
 - 7. Notify the Architect in writing of any anticipated problems during bidding with the use of specified coating systems with substrates primed by others.
- C. Coatings and Pigments:
 - 1. To be pure, non-fading, applicable types to suit substrates and service expectations indicated.
 - 2. Ready mixed, except field catalyzed coating.
 - 3. Pigments processed to a soft paste consistency, capable of being readily and uniformly dispersed to as a homogeneous coating.
 - 4. Good flow and brushing properties; capable of drying or curing free of streaks or sags.
- D. Accessory Materials:
 - 1. All materials, such as linseed oil, shellac, turpentine, paint thinners, and other materials not specifically indicated but required to achieve the finishes specified.
 - 2. All of commercial quality.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine surfaces scheduled to be finished prior to commencement of work.
 - 1. Report any conditions that may potentially affect proper application.
 - 2. Verify that surfaces and substrate conditions are ready to receive work as instructed by the product manufacturer.
 - 3. Do not proceed with work until unsatisfactory conditions have been corrected.
- B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film or proper adhesion required.
- C. Beginning of installation equates to acceptance of the substrate by the contractor.
- D. Precast Panels Inspection:
 - 1. A representative of the paint manufacturer is to visit the site, prior to application of the conditioner and prep coats, to inspect the concrete for review and approval of substrate conditions.
 - 2. A representative of the paint manufacturer is to visit the site, after application of the conditioner and prep coats, to perform an adhesion test to assure that the prep coats penetrated the concrete to an acceptable degree.

3.02 PREPARATION - GENERAL

- A. Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.
 - 1. Clean surfaces to be painted before applying paint or surface treatments.
 - 2. Remove oil and grease prior to mechanical cleaning.
 - 3. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly painted surfaces.
- B. Provide all scaffolding and staging required for work in this Section.
 - 1. Coordinate locations to eliminate interference with work of others.
- C. Remove hardware, hardware accessories, machined surfaces, electrical plates, lighting fixtures, trim, clocks, speakers, devices, fittings and similar items which are not to be finish-painted, prior to preparing surfaces or finishing.
- D. Provide surface-applied protection prior to surface preparation and painting operations for all adjacent areas, surfaces, or items to remain.
- E. Correct minor defects and clean surfaces which affect work of this Section.
- F. Shellac and seal marks which may bleed through surface finishes.

3.03 MATERIALS PREPARATION

- A. Mix and prepare painting materials in accordance with manufacturer's directions.
- B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing and application of paint in a clean condition, free of foreign materials and residue.

3.04 SURFACE PREPARTION

- A. Uncoated Steel and Iron Surfaces:
 - 1. 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.
 - 2. Where heaving coatings of scale are evident, remove by wire brushing or sandblasting; clean by washing with solvent.
 - 3. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned.

- B. Shop Primed Steel Surfaces:
 - 1. Sand and scrape to remove loose primer and rust.
 - 2. Feather edges to make touch-up patches inconspicuous.
 - 3. Clean surfaces with solvent.
 - 4. Prime bare steel surfaces.
 - 5. Touch-up shop-applied prime coats wherever damaged or bare, and where required by other sections of these specifications. Clean and touch-up with same type shop primer.

- C. Galvanized Surfaces:
 - 1. Remove surface contamination and oils and wash with non-petroleum based solvent.
 - 2. Apply coat of etching primer.

- D. Unit Masonry Surfaces:
 - 1. Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter.
 - 2. Remove oil and grease with a solution of tri-sodium phosphate, rinse well and allow to dry.
 - 3. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water.
 - 4. Allow to dry.

- E. Gypsum Board Surfaces:
 - 1. Latex fill minor defects.

- F. Plaster Surfaces:
 - 1. Fill hairline cracks, small holes, and imperfections with latex patching plaster.
 - 2. Make smooth and flush with adjacent surfaces.
 - 3. Wash and neutralize high alkali surfaces.

- G. Metal Doors and Metal Frames:
 - 1. Apply one coat of paint to glazing stops and rabbets prior to glazing.

- H. Insulated Coverings:
 - 1. Remove dirt, grease and oil from canvas and cotton.

- I. Hand Tool Cleaning:
 - 1. Hand tool cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust and paint be removed by this process.
 - 2. Mill scale, rust and paint are considered adherent if they cannot be removed by lifting with a dull putty knife.
 - 3. Prior to hand tool cleaning, remove visible oil, grease, soluble residues and salts by the methods outlined in the "Steel Structures Paint Council Surface Preparation Specification No. 2 (SSPC-SP1 and SSPC-SP2).

- J. Precast Panels:
 - 1. Allow concrete to cure a minimum of 30 days after erection before cleaning.
 - 2. Clean with oscillating tip power washer.
 - 3. Clean all surfaces of tilt walls with a Citrus Acid Wash Cleaner to completely remove ALL bond breakers and any/all other chemicals which can interfere with paint and sealant adhesion.
 - 4. Clean all joint and rib edges and faces of panels.
 - 5. Fill all holes and gaps with acrylic latex surface filler.
 - 6. Grind all rough edges and grind and fill all honeycombs to provide smooth surface.

3.05 PROTECTION

- A. Protect elements surrounding the work of this Section from damage or disfiguration.
- B. Repair damage to other surfaces caused by work of this Section.
- C. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.
- D. Remove empty paint containers from site.

3.06 APPLICATION

- A. General:
 - 1. Apply paint and coatings in strict accordance with manufacturer's published directions. Apply all coatings at manufacturer's recommended spreading rates per coat to provide finished wet mil and dry mil coverage per coat between the minimum and maximum microns indicated.
 - 2. 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 insure that surfaces, including edges, corners, crevices, welds and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 - 3. Paint surfaces behind movable equipment same as similar exposed surfaces.
 - 4. Paint back sides of access panels, and removable or hinged covers to match exposed surfaces.
 - 5. Sand lightly between each succeeding enamel or varnish coat.
 - 6. Omit first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise indicated.
- B. Scheduling Painting:
 - 1. 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.
 - 2. Allow sufficient time between successive coatings to permit proper drying.
 - 3. Do not apply finishes to surfaces that are not dry.
- C. Technique:
 - 1. Apply each coat to uniform finish.
 - 2. Apply each coat of paint slightly darker than preceding coat, unless otherwise approved.
 - 3. Sand lightly between coats to achieve required finish.
 - 4. Allow applied coat to dry before next coat is applied.
- D. Apply paint as recommended by the manufacturer and as approved by the Architect:
 - 1. Apply final coat to concrete, masonry and smooth finished wall and ceiling surfaces with roller.
 - 2. Apply paint to exposed ceiling surfaces and in inaccessible areas by spraying.
 - 3. Do not use spray application on other areas without written approval of Architect.
 - 4. 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.

- E. Draw lines of demarcation between different shades or colors to eliminate blurred edges.
- F. Back-prime all surfaces of interior and exterior wood blocking and woodwork, except pressure treated wood, with one coat of aluminum paint.
- G. Prime back surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.
- H. Where clear finishes are required, tint fillers to match wood.
 - 1. Work fillers into the grain before set.
 - 2. Wipe excess from surface.
- I. Coat steel items that come in contact with aluminum items with a field coat of bituminous paint.
- J. Mechanical and Electrical Work:
 - 1. Painting of mechanical and electrical work is limited to those items exposed in finished occupied spaces.
 - 2. Mechanical items to be painted include, but are not limited to, ducts, diffusers, piping, pipe hangers, supports and accessory items.
 - 3. Electrical items to be painted include, but are not limited to, the following:
 - a. Conduit and fittings (In finished areas only, unless otherwise indicated).
 - b. Switchgear (In Finished areas only, unless otherwise indicated).
- K. Paint all exposed ceiling construction, including joists, structural members, metal deck and all exposed conduit, pipes, pipe covering and ductwork in these ceiling areas.
- L. Seal, stain and varnish concealed and semi-concealed surfaces of millwork items.
 - 1. Seal internal surfaces of millwork items with two coats of shellac.
 - 2. Brush apply only.
- M. Prime Coats:
 - 1. Apply prime coat of material which is required to be painted or finished, and which has not been prime coated by others.
 - 2. 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.
- N. Pigmented (Opaque) Finishes:
 - 1. Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage.
 - 2. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.
- O. Completed Work:
 - 1. Match approved samples for color, texture and coverage.
 - 2. Remove, refinish or repaint work not in compliance with specified requirements.
- P. Precast Panels:
 - 1. Allow panels to completely dry after washing.
 - 2. Do not paint walls if the surface temperature is less than 55 degrees F.
 - 3. Apply finished topcoats within seven (7) days after application of conditioner.
 - 4. Joint sealants are NOT to be painted.

3.07 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Paint shop primed equipment.
- B. Touch up marred or damaged shop prefinished items.
- C. Remove unfinished louvers, grilles, covers and access panels on mechanical and electrical components and paint separately.
- D. Replace identification markings on mechanical or electrical equipment when painted accidentally.
- E. Paint interior surfaces of air ducts and convector and heating cabinets that are visible through grilles and louvers with one coat of flat black paint, to limit sight line.
 - 1. Paint dampers exposed behind louvers, grilles, and convector and heating to match face panels.
- F. Paint exposed conduit and electrical equipment occurring in finished areas.
- G. Paint both sides and all edges of plywood backboards for electrical and telephone equipment with one coat of light to medium gray paint before installation of equipment.
- H. Reinstall electrical plates, hardware, light fixture trim, clocks, speakers and fittings removed prior to finishing.
- I. Paint all equipment located on roofs, including aluminum exhaust fans, gravity relief vents, appliance exhausts and all equipment unless factory finish is acceptable to Architect.
- J. Refer to Division 15 and Division 16 for schedule of color coding and identification banding of equipment, ductwork, piping and conduit.

3.08 CLEANING AND PROTECTION

- A. As work proceeds, promptly remove paint where spilled, splashed or spattered.
- B. During progress of work maintain premises free of unnecessary accumulation of tools, equipment, surplus material and debris.
- C. Collect cotton waste, cloths and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.
- D. During progress of work remove from site discarded paint materials, rubbish, cans and rags at end of each work day. **DISPOSE OF ALL MATERIALS IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS.**
- E. Upon completion of painting work, clean window glass and other paint-spattered surfaces.
- F. Protection:
 - 1. 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.
 - 2. 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.
 - 3. At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

3.09 PAINT SYSTEM SCHEDULE - EXTERIOR PAINT SYSTEMS

- A. STEEL, GALVANIZED (exterior, new construction, painted finish):
- 1st Coat - Universal Primer
"S-W, PRO Industrial, Pro-Cryl, Universal Primer, B66A00310"
*Gray.
 - 2nd Coat - 100% Acrylic Emulsion
"S-W, Metalatex, Semi-Gloss Coating, B42W00111"
 - 3rd Coat - 100% Acrylic Emulsion
"S-W, Metalatex, Semi-Gloss Coating, B42W00111"
*Not less than 3.0 mils dry film thickness.
- B. STEEL, SHOP PRIMED (exterior, new construction, painted finish):
- Touch-Up - Rust-Inhibitive Metal Primer
"S-W, Kem Bond HS, Universal Metal Primer"
*May use original primer if available.
*Color selected as most appropriate to match primer.
 - 2nd Coat - Urethane Alkyd Topcoat
"S-W, Industrial Urethane Alkyd Enamel, B54-150 Series, Gloss"
 - 3rd Coat - Urethane Alkyd Topcoat
"S-W, Industrial Urethane Alkyd Enamel, B54-150 Series, Gloss"
*Not less than 3.0 mils dry film thickness.

3.10 PAINT SYSTEM SCHEDULE - INTERIOR PAINT SYSTEMS

- A. CONCRETE MASONRY UNITS (interior, painted finish):
- 1st Coat - Block Surfer
"S-W, Loxon Block Surfer, A24W200"
*Apply filler coat at a rate to ensure complete coverage with pores filled.
 - 2nd Coat - Interior Latex Topcoat
"S-W, ProMar 200, Interior Waterbased Acrylic-Alkyd, Eg-Shel"
 - 3rd Coat - Interior Latex Topcoat
"S-W, ProMar 200, Interior Waterbased Acrylic-Alkyd, Eg-Shel"
- B. STEEL, UNPRIMED (interior, new construction, painted finish):
- 1st Coat - Rust-Inhibitive Metal Primer
"S-W, Kem Bond HS, Universal Metal Primer"
*Color selected as most appropriate beneath finish topcoats.
 - 2nd Coat - Urethane Alkyd Topcoat
"S-W, Industrial Urethane Alkyd Enamel, B54-150 Series, Gloss"
 - 3rd Coat - Urethane Alkyd Topcoat
"S-W, Industrial Urethane Alkyd Enamel, B54-150 Series, Gloss"
*Not less than 3.0 mils dry film thickness.

- C. STEEL, SHOP PRIMED (interior, new construction, painted finish):
Touch-Up - Rust-Inhibitive Metal Primer
"S-W, Kem Bond HS, Universal Metal Primer"
*May use original primer if available.
*Color selected as most appropriate to match primer.
- 2nd Coat - Urethane Alkyd Topcoat
"S-W, Industrial Urethane Alkyd Enamel, B54-150 Series, Gloss"
- 3rd Coat - Urethane Alkyd Topcoat
"S-W, Industrial Urethane Alkyd Enamel, B54-150 Series, Gloss"
*Not less than 3.0 mils dry film thickness.
- D. STEEL, GALVANIZED (interior, new construction, painted finish):
1st Coat - Solvent-Based Acrylic Coating
"S-W, Galvite HS, B50WZ30"
- 2nd Coat - Urethane Alkyd Topcoat
"S-W, Industrial Urethane Alkyd Enamel, B54-150 Series, Gloss"
- 3rd Coat - Urethane Alkyd Topcoat
"S-W, Industrial Urethane Alkyd Enamel, B54-150 Series, Gloss"
*Not less than 3.0 mils dry film thickness
- E. METAL DOORS AND FRAMES (interior, new construction, painted finish):
Touch-Up - Rust-Inhibitive Metal Primer
"S-W, Kem Bond HS, Universal Metal Primer"
*May use original primer if available.
*Color selected as most appropriate to match primer.
- 2nd Coat - Urethane Alkyd Topcoat
"S-W, Industrial Urethane Alkyd Enamel, B54-150 Series, Gloss"
- 3rd Coat - Urethane Alkyd Topcoat
"S-W, Industrial Urethane Alkyd Enamel, B54-150 Series, Gloss"
*Not less than 3.0 mils dry film thickness.
*Additional coats as required by Architect to achieve desired and intended result.
- F. PLASTER CEILING (interior, new construction, epoxy coating):
1st Coat - Latex Primer
"S-W, ProMar 200 Zero VOC, Interior Latex Primer, B28W02600"
*Tinted toward final color.
- 2nd Coat - Pre-Catalyzed Waterbased Epoxy Topcoat
"S-W, Pre-Catalyzed Waterbased Epoxy"
K46 Series, Semi-gloss
- 3rd Coat - Pre-Catalyzed Waterbased Epoxy Topcoat
"S-W, Pre-Catalyzed Waterbased
K46 Series, Semi-gloss

- G. PVC / PLASTIC / FIBERGLASS (interior, new construction, painted finish):
- 1st Coat - Waterborne Acrylic Primer
"S-W, Multi-Purpose Interior/Exterior Latex Primer Sealer, B51 Series"
* Off White
 - 2nd Coat - Interior Acrylic Topcoat
"S-W, ProClassic Waterborne, Interior Acrylic Satin, B20 Series"
 - 3rd Coat - Interior Acrylic Topcoat
"S-W, ProClassic Waterborne, Interior Acrylic Satin, B20 Series"
- H. DRY FALL PAINT (interior, new construction, painted finish):
- *Used at exposed overhead applications as permitted by the Architect.
 - 1st Coat - Primer
Primer per manufacturer as applicable to substrate materials
 - 2nd Coat - Waterborne Acrylic Dry Fall
"S-W, Dry Fall Flat, B42 Series"
*Brilliant White (B42W81) or Black (B42B81) as directed by the Architect.
 - 3rd Coat - Waterborne Acrylic Dry Fall
"S-W, Dry Fall Flat, B42 Series"
*Brilliant White (B42W81) or Black (B42B81) as directed by the Architect.
*Not less than 4.0 mils dry film thickness.

3.11 PAINT SYSTEM SCHEDULE - CONCRETE PRECAST WALL PANELS

A. EXTERIOR PAINT SYSTEM:

- 1st Coat - 100% Acrylic Emulsion Conditioner
"S-W, Loxon Conditioner, A24-100 Series"
*Tinted toward final color.
- 2nd Coat - Elastomeric Topcoat
"S-W, ConFlex XL, Smooth Elastomeric High Build Coating, A5-400 Series"
*Resulting surface to have 10 or less pinholes per square foot.
*To be minimum 12-15 mils total dry film thickness.
- 3rd Coat - Elastomeric Topcoat
"S-W, ConFlex XL, Texture High Build, A5-800 Series"
*Resulting surface to have 10 or less pinholes per square foot.
*To be minimum 12-15 mils total dry film thickness.

B. INTERIOR PAINT SYSTEM:

- 1st Coat - 100% Acrylic Emulsion Conditioner
"S-W, Loxon Conditioner, A24-100 Series"
*Tinted toward final color.
- 2nd Coat - Interior Latex Topcoat
"S-W, ProMar 200, Interior Waterbased Acrylic-Alkyd, Eg-Shel"
- 3rd Coat - Interior Latex Topcoat
"S-W, ProMar 200, Interior Waterbased Acrylic-Alkyd, Eg-Shel"

C. SPECIAL REQUIREMENTS:

1. Finish:
 - a. Topcoat finish texture to be selected by Architect from Fine, Medium or Extra Coarse.
 - b. Provide 24"x24" sample boards of each texture for selection of topcoat finish.
2. Joint Sealants:
 - a. The paint and joint sealant are required to be compatible with one another and together shall be considered to be a complete system.
 - b. Provide paint manufacturer's certification of compatibility with joint sealants.
 - c. Joint sealants are NOT to be painted or installed prior to painting of tilt wall surfaces.
3. Protection of Tilt Wall Joints:
 - a. Install backer rod at front of joint to be sealed, at location of final sealant installation.
 - b. Once tilt wall surfaces are completely painted, backer rod is to be pushed back into the joint to allow for installation of the sealant in its proper final location.
 - c. This allows the backer rod to temporarily cover the side surfaces of the tilt wall joint where the sealant will be installed so that these surfaces remain unpainted and allow for proper adhesion of the joint sealants to the tilt wall surfaces within the joint.
4. Warranty:
 - a. Provide a five (5) year warranty for complete exterior paint system.

SUBMITTAL CHECKLIST

1. Product Data.
2. Samples and Draw Downs.
3. Mock-Ups.
4. Compatibility Tests.
5. Additional Submittals for Precast Panels.

END OF SECTION 09900

SECTION 09984 – DECORATIVE EPOXY FLAKE FLOOR COATING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Resinous flooring: Abrasion, impact and chemical resistant, decorative aggregate-filled epoxy-resin-based monolithic floor surfacing designed to produce a seamless floor and integral cove base.
- B. Extent of decorative mosaic floor coatings are indicated on Drawings and specified herein.
- C. All work of this section included in Alternate No. 7

1.02 QUALITY ASSURANCE

- A. Installer: A firm familiar with work with not less than five years of experience in installing products similar to those required for this project.
- B. Deliver materials to project site in original packages or containers clearly labeled to identify manufacturer, brand name, quality or grade and fire hazard classification.
- C. Store materials in original undamaged packages or containers. Maintain temperature in storage area above 40°F. Store per manufacturer's recommendations.
- D. Illuminate areas of installation using building's permanent lighting system; temporary lighting alone will not be acceptable.

1.03 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's product data sheets, cutsheets, specifications, materials description, installation and maintenance instructions.
 - 2. Materials Safety and Data Sheets (MSDS).
- B. Samples:
 - 1. Actual samples of all colors and finishes.
 - 2. Colors and finishes to be selected by Architect from manufacturer's entire selection.
- C. Mock-Up Panel:
 - 1. Construct on site, sample panels, 4 foot x 4 foot minimum in size.
 - 2. Concrete shall be cured at least 28 days prior to application of the stain, so multiple panel slabs should be cast at the same time to allow for multiple samples opportunities in timeframe required.
 - 3. Panel to be a concrete slab apart from any concrete areas associated within the project.
 - 4. Show proposed color, range, texture, and workmanship of floor coating application, including sealer, to demonstrate the finished product.
 - 5. Do not proceed with floor coating work until sample panel has been approved by the Architect.
 - 6. If deemed unacceptable by the Architect, create another panel to correct items of unacceptability. Continue process until and approved panel has been achieved.
 - 7. Once an approved panel has been achieved, use panel as standard of comparison for all stain work.
 - 8. Do not destroy or remove panel until all stain work is complete and accepted.

PART 2 - PRODUCTS

2.01 Decorative Epoxy Coating

- A. Basis of Specification:
1. "Sherwin-Williams/General Polymers"; Decorative Mosaic Epoxy Coating System.
- B. Epoxy Floor Coating/Decorative Flake Additive/ Urethane Top Coat:
1. Primer: "Sherwin-Williams/ General Polymers", "3579", epoxy primer
Rate of Application: 200-300 SF/ gallon.
 2. Body Coat: "Sherwin-Williams/ General Polymers", "3745" body coat.
Rate of Application: 200-300 SF/ gallon.
* Apply decorative broadcast paint flake over second coat while still tacky and not completely cured.
* Blastrac pattern shall be completely hidden by second coat. Additional coats as required by Architect to achieve desired and intended result to hide below.
 3. Grout Coat: "Sherwin-Williams/ General Polymers", "3745" grout coat.
Rate of Application: 160-250 SF/ gallon.
 4. Seal Coat: "Sherwin Williams/ General Polymers", "4638" seal coat.
Rate of Application: 300-500 SF/ gallon.
- C. Integral Cove Base:
1. Basis of Specification: "General Polymers" 3561V Epoxy Cove Paste.
 - a. Apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding and topcoating of cove base. Round internal and external corners.
 - b. 8" high or as noted on Drawings.
- D. Color:
1. Coating and decorative flake colors as selected by Architect from manufacturer's entire selection.
 2. Color selection is indicated on the Drawings.
- E. Finish:
1. Semi-Gloss finish.
 2. Withstand heavy industrial traffic, abrasion, and general chemical attack.
- F. Additives, Primers and Sealers:
1. None permitted.
 2. Concrete Kure-N-Seal product not permitted in areas to receive concrete floor coating.
 3. The use of Quick-Kick Epoxy Accelerator is not permitted in areas to receive concrete floor coating.

2.02 Decorative Broadcast Epoxy Coating

- A. Basis of Specification:
1. "Sherwin-Williams/General Polymers"; Ceramic Carpet #400 Decorative Broadcast.
- B. Decorative Epoxy Coating with Quartz Aggregates /Slip-Resistant Additive/Urethane Top Coat:
1. Primer: "Sherwin-Williams/ General Polymers", "3579", epoxy primer
Rate of Application: 250 SF/ gallon.
 2. 1st Broadcast: "Sherwin-Williams/ General Polymers", "5900F" granules.
Rate of Application: .4 lbs / SF.
"Sherwin-Williams/ General Polymers", "3561", 1st Broadcast
Rate of Application: 65-70 SF/ gallon.
* Blastrac pattern shall be completely hidden by second coat. Additional coats as required by Architect to achieve desired and intended result to hide below.
 3. 2nd Broadcast: "Sherwin-Williams/ General Polymers", "5900F" granules.
Rate of Application: .4 lbs / SF.
"Sherwin-Williams/ General Polymers", "3561", 1st Broadcast
Rate of Application: 65-70 SF/ gallon.
 4. Grout Coat: "Sherwin-Williams/ General Polymers", "3745" grout coat.
Rate of Application: 100 SF/ gallon.
 5. Top Coat: "Sherwin-Williams/ General Polymers", "4409" WB Polyurethane Satin
Rate of Application: 200 SF/ gallon.
- C. Integral Cove Base:
1. Basis of Specification: "General Polymers" 3561V Epoxy Cove Paste.
 - a. Apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding and topcoating of cove base. Round internal and external corners.
 - b. 8" high or as noted on Drawings.
- D. Color:
1. Coating and decorative flake colors as selected by Architect from manufacturer's entire selection.
 2. Color selection is indicated on the Drawings.
- E. Finish:
1. Semi-Gloss finish.
 2. Withstand heavy industrial traffic, abrasion, and general chemical attack.
- F. Additives, Primers and Sealers:
1. None permitted.
 2. Concrete Kure-N-Seal product not permitted in areas to receive concrete floor coating.
 3. The use of Quick-Kick Epoxy Accelerator is not permitted in areas to receive concrete floor coating.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Ensure floor surfaces are clean, dry, sound, and fully cured. Remove all form release agents, curing compounds, salts, efflorescence, laitance, oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.
- B. Consult manufacturer's recommendation for substrate prep and cleaning.
- C. Test floor for vapor drive in accordance with ASTM D 4263 and per manufacturer's recommendations.
- D. Blast entire floor surface to receive specified floor coatings. Required finished profile of CSP1-3 prior to any coating taking place.
- E. Repair concrete imperfections, apply crack fillers, and install joint sealants as required and as compatible with floor coating products.
- F. Clean all surfaces of oil, grease, or other bond-inhibiting materials per manufacturer's recommendations.
- G. Surfaces must be clean, dry, sound and offer sufficient profile to achieve adequate adhesion. Remove all form release agents, curing compounds, salts, efflorescence, laitance, and other foreign matter by sandblasting, shotblasting, mechanical scarification. Perform this work at no additional cost or change in time. Rinse thoroughly to achieve a final pH as specified by the manufacturer and allow to dry thoroughly prior to coating.

3.02 INSTALLATION

- A. Install according to manufacturer's instructions and recommendations.
- B. Apply first finish coat at rate specified above. Apply second finish coat at rate specified above when first coat is dry, no sooner than 12 hours after completing first coat, but no more than 48 hours.
- C. Utilize spike shoes to apply decorative broadcast flakes over concrete coating. Apply flakes as double broadcast to achieve complete coverage of Epoxy Floor Coating.
- D. Remain off of floor surface until completely dried.
- E. Approval required by Architect of Finish coats of epoxy floor coating prior to applying Urethane Top Coat.

3.03 ADJUST AND CLEAN

- A. Assure finish is uniform and consistent.
- B. Replace removed plates and covers on floors.
- C. Remove surplus materials, rubbish, and debris resulting from installation upon completion of work, and leave areas of installation in neat, clean condition.
- D. Clean surface of all debris. Sweep and mop to a smooth, clean appearance.

- E. Improper installation or improper use of products will result in the final floor coating to have an undesirable result. If the final surfacing is deemed unacceptable by the Architect, the entire system is to be removed completely, and the substrate properly re-prepped. The system is to be reapplied to an acceptable final result. All costs associated with this procedure are to be at the expense of the contractor with no additional costs to the Owner. The level of acceptability is at the sole discretion of the Architect.

SUBMITTAL CHECK LIST

1. Material Samples.
2. Manufacturer's Literature.
3. Material Safety and Data Sheets.

END OF SECTION 09984

SECTION 10100 – VISUAL DISPLAY BOARDS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, supervision and services required to furnish and install all wall-mounted visual display boards as follows:
 - 1. Markerboards.
 - 2. Tackboards.

1.02 SUBMITTALS

- A. Shop Drawings:
 - 1. Indicate elevations of all boards and layout/arrangement of boards where multiple exist together.
 - 2. Indicate size, location, joints, arrangements, and materials.
 - 3. Indicate section details.
 - 4. Indicate installation, backing anchorage, and accessories.
- B. Maintenance Instructions:
 - 1. Include in Maintenance Manual, manufacturer's instructions on cleaning surfaces.
- C. Samples:
 - 1. Markerboard face sheet color samples.
 - 2. Tackboard surface samples.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Delivery:
 - 1. Deliver material in manufacturer's original, unopened, undamaged, protective packaging.
 - 2. Identify package contents by product, size, and location of installation in project.
- B. Store materials in manufacturer's original protective packaging.
- C. Protect units from soiling, damage, moisture, and construction activity.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Basis of specification is "Platinum Visual Systems" Model BTS, Box Tray Trim System.
- B. Provide materials equal to the above-listed product, as approved by the Architect, by one of the following acceptable manufacturers:
 - 1. "Claridge"
 - 2. "Polyvision"
 - 3. "Aarco Products"
 - 4. "Platinum Visual Systems"
 - 5. "Marsh Industries, Inc."
 - 6. "CIG JAN Products"

2.02 MATERIALS

- A. Markerboards:
1. Face Sheet: Porcelain enamel finish, conform to Porcelain Enamel Institute Specifications S-104. Minimum 24 gauge enameling grade steel sheet, magnetic.
 2. Core Material: 7/16" medium density fiberboard hardboard (MDF), or 1/2" particleboard.
 3. Panel Backing: .015" aluminum sheet panel.
 4. Joints: Hairline with continuous 14 ga. metal spline, concealed.
 5. Size: Height x Length as indicated on Drawings.
 6. Colors: White gloss.
- B. Tackboards:
1. Surface: Minimum 21 oz. ply self-healing vinyl fabric, coarse linen pattern. Washable and mildew-resistant.
 2. Face Sheet: 1/4" self-healing cork.
 3. Core Material: 1/4" hardboard.
 4. Size: Height x Length as indicated on Drawings.
 5. Colors: As selected by Architect from manufacturer's standard selection.
- C. Trim:
1. Provide on all types of visual display boards, entire perimeter, unless specifically indicated otherwise.
 2. No trim is required on frameless type tackboards.
 3. Extruded aluminum 6063-T5, clear anodized, satin finish.
 4. Snap-on type, with clips.
 5. Lengths of trim are to be a continuous length piece, without a seam or butt joint. Applies to all edges at entire perimeter of each complete unit; tops, bottoms, and sides of all units. Spliced trim pieces are not acceptable and will be cause for rejection and replacement.
- D. Mounting:
1. Provide on all types of visual display boards.
 2. Wall attachment hardware, concealed from view, unless specifically indicated otherwise.
- E. Map and Display Rail:
1. Provide on all markerboards.
 2. Extruded aluminum 6063-T5, clear anodized, satin finish.
 3. 2" high, continuous with closed ends.
 4. 1/4" thick cork insert.
- F. Accessories:
1. Provide on all markerboards.
 2. Map Hooks: One per linear foot of map and display rail.
 3. Flag Holders: One per room.
 4. Marker Tray: Continuous cast aluminum with closed ends.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Wall-hang units tight and secure to wall surface.
- B. Install in strict accordance with manufacturer's instructions.
- C. Keep perimeter lines straight, plumb and level, and in plane of wall.
- D. Joints, if required, shall be minimal, balanced, symmetrical, and straight.
- E. Fit butted joints tightly in same plane.
- F. Install anchor clips and brackets min. 16" o.c.
- G. Clean to original finish: break in surface if required.

3.02 INSTALLATION SCHEDULE:

- A. Install items at 2'-10", unless noted otherwise. Verify with Architect prior to installation.
- B. Heights indicated are to the marker tray, or bottom of frame of tackboards.

SUBMITTAL CHECK LIST

- 1. Shop Drawings.
- 2. Maintenance Instructions.
- 3. Samples.

END OF SECTION 10100

SECTION 10171 - SOLID PLASTIC TOILET PARTITIONS

PART 1 - GENERAL

1.01 WORK INCLUDED

Furnish labor, materials, equipment, special tools, supervision and services required to furnish and install all toilet partitions indicated, noted and detailed on the drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 05500 - Miscellaneous Metals

Section 10800 - Toilet Accessories

1.03 SUBMITTALS

A. Shop Drawings:

1. Complete shop and erection drawings showing plan layout, all fabrication and erection details, anchorage, hardware and accessories.

B. Manufacturer's Literature:

1. Manufacturer's product data and descriptive literature.
2. Manufacturer's installation instructions.
3. Manufacturer's maintenance instructions.
4. Material safety data sheets.

C. Samples:

1. Provide colors as specified on drawings.
2. If color is not specified, submit samples of manufacturer's entire selection.
3. Color charts alone may not be acceptable. Provide actual samples for selection upon request.

1.04 DELIVERY, STORAGE AND HANDLING

A. Delivery:

1. Deliver material in original unopened, undamaged packages.
2. Identify by contents, color and room number.

B. Store materials in original protective packaging to prevent soiling, damage or wetting.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Provide materials manufactured by one of the following, or an approved equivalent.

1. "Scranton Products" (Santana - Comtec - Capitol)
2. "Accurate Partitions"
3. "Ampco Products"
4. "Global Partitions"
5. "Rockville Partitions"
6. "Metpar"
7. "Sanymetal Partitions"
8. "Bradley / Mills Partitions"
9. "Columbia Partitions"
10. "Hadrian"

- B. See Specifications Section 01630 – Product Options and Substitutions.
- C. If color and/or texture selection is indicated on Drawings, alternate manufacturer's must be able to provide an exact match to that specified in order to be deemed equivalent and acceptable.

2.02 MATERIALS

- A. Doors, Partitions, Pilaster and Screens: High-density polyethylene (HDPE).
- B. Hardware and Fittings:
 - 1. Connection Brackets:
 - a. 54" long, heavy-duty extruded aluminum.
 - b. Bright anodized finish.
 - c. Stainless steel screws.
 - 2. Wall Brackets:
 - a. 54" long, heavy-duty extruded aluminum.
 - b. Bright anodized finish.
 - c. Stainless steel screws.
 - 3. Aluminum Door Hinges:
 - a. All Stall Doors: Continuous cam-action hinge and fabricated from heavy-duty (1/8" thick) extruded aluminum or stainless steel.
 - b. Through bolted with one-way sex bolts.
 - c. Hinges: To remain open at approximately 15° when not in use.
 - 4. Pilaster Shoes:
 - a. 3" high, stainless steel.
 - 5. Latches, Strike and Keeper:
 - a. Heavy duty aluminum, brite finish.
 - b. Provide pull on each side of door in each ADA stall or ambulatory stall.
 - c. Emergency outside access feature on latch.
 - d. Provide combination coat hooks and bumpers at each door interior face.
 - 6. Headrail:
 - a. Heavy-duty extruded aluminum.
 - b. Bright anodized finish.
 - c. Stainless steel screws.
 - d. Anti-grip profile.
 - e. Extruded profile to incorporate an integral track to accept a shower/privacy curtain and hooks.
Where curtains are to be installed, provide quantity of hooks needed to provide equal and proper support of curtain in the arrangement and layout indicated.
 - 7. Fasteners:
 - a. Theft-resistant, finish to match hardware.
 - 8. Heat Sync:
 - a. Aluminum strip per manufacturer.
 - b. Continuous on bottom of all doors and panels.
 - 9. Coat Hook:
 - a. Provide one hook on inside of each toilet partition stall door.
 - b. Surface mounted, stainless steel, satin finish, with concealed mounting.
 - c. Mount at ADA height at all ADA stalls.

2.03 FABRICATION

- A. Design:
 - 1. Floor Mounted, Overhead Braced.

- B. Panels:
 - 1. Pre-pierce panels for fittings and hardware.
 - 2. Conceal reinforcement for hardware.

- C. Thickness:
 - 1. 1 inch thick panels.
 - 2. 1/4 inch corner radius, all edges.

- D. Size:
 - 1. Configuration and layout as indicated on the Drawings.
 - 2. Toilet partition panels to be 4'-7" height.
 - 3. Urinal screen panels to be 3'-6" height.
 - 4. Pilasters to be 6'-10" height.
 - 5. Locate all panels from finished floor as shown on the Drawings for the mounting heights desired.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Assemble using stainless steel screws.

- B. Anchor to wall with connectors appropriate for substrate.

- C. Set plumb and true to line and level, in a rigid substantial manner.

- D. Conceal drilling, cutting and fitting in walls and ceiling.

- E. Clearance at vertical edge of doors shall be uniform top to bottom and not exceed 3/16".

3.02 CLEANING

- A. Upon completion, remove all materials, equipment and debris from the premises.

- B. Wash thoroughly with cleaner recommended by manufacturer.

SUBMITTAL CHECK LIST

- 1. Shop Drawings.
- 2. Manufacturer ' s Literature.
- 3. Samples.

END OF SECTION 10171

SECTION 10200 - LOUVERS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor materials, equipment, special tools, supervision and services necessary to provide architectural air intake and exhaust louvers as indicated on the Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 07900 - Joint Sealers
- Division 15 - Air Outlets and Inlets
- Division 15 - Testing, Adjusting and Balancing

1.03 REFERENCES

- A. ADC 1062 - Certification, Rating and Test Manual.
- B. AMCA 500 - Test Method for Louvers, Dampers and Shutters.
- C. ARI 650 - Air Outlets and Inlets.
- D. ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.

1.04 QUALITY ASSURANCE

- A. Test and rate performance of louvers in accordance with AMCA 500.

1.05 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's product data sheets, cutsheets, specifications, materials description, installation and maintenance instructions.
- B. Shop Drawings:
 - 1. Show proposed method of installation, anchoring and interface between the work of this Section and the work of adjacent trades.
- C. Samples:
 - 1. Actual samples of all items needed for colors and finishes.
 - 2. Colors and finishes to be selected by Architect from manufacturer's entire selection.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide products, as approved by the Architect, from one of the following approved manufacturers:
 - 1. "Ruskin Company"
 - 2. "Air Louvers, Inc."
 - 3. "Dowco, Inc."
 - 4. "American Warming and Ventilating"

2.02 LOUVERS

- A. Basis of Specification: "Ruskin", ELF-81S30.

- B. Frame:
 - 1. Extruded Aluminum, 6063-T5, .080 inch min. thickness.
 - 2. 4 inch frame nominal depth.
 - 3. Size, profile and configuration as indicated on the Drawings.
 - 4. Finish: Baked enamel coating, color as selected from manufacturer's entire standard selection.

- C. Blades:
 - 1. Extruded Aluminum, 6063-T5, .080 inch min. thickness.
 - 2. "K" style blade profile.
 - 3. 30° angle blades, 3-1/4 inch nominal spacing.
 - 4. Finish: Color and finish to match frame.

- D. Extended Sill Sub-Frame:
 - 1. Extruded aluminum, 6063-T5, .080 inch min. thickness.
 - 2. Extended front counterflashing leg and raised rear flashing leg in "Z" profile.
 - 3. Finish: Color and finish to match frame.

- E. Screens:
 - 1. 1/2 inch frame x 19 gauge galvanized steel bird screen.
 - 2. Rear mounted.
 - 3. Finish: Aluminum frame color and finish to match frame.

2.03 FABRICATION

- A. Fabricate with hidden mullions.

- B. Louvers too large for shipping may be assembled on site from factory fabricated sections to provide the required overall size.

- C. Provide integral structural supports to withstand 20 psf wind load.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Field verify all dimensions prior to fabricating louvers.

3.02 INSTALLATION

- A. Install per manufacturer's details and recommendations.
- B. Paint portions of aluminum subframe in contact with concrete on mortar with bituminous paint.
- C. Install sealant along entire perimeter of louver.

3.03 PROTECTION

- A. Protect louvers from damage.

SUBMITTAL CHECK LIST

- 1. Product Data.
- 2. Shop Drawings.
- 3. Color Samples.

END OF SECTION 10200

SECTION 10420 - PLAQUE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, supervision and services required to fabricate, deliver and install all plaques as noted and detailed on the Drawings and specified herein.
- B. Architect will furnish names and titles of items to be included on plaque during the submittal process.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 06100 – Rough Carpentry

1.03 SUBMITTALS

- A. Submit manufacturer's product data, cutsheets and specifications to illustrate conformance with the specifications and for selection and/or verification of all plaque layout and construction items.
- B. Provide initial layout of plaque, by including the required identification information herein, so as to provide a proofing copy for review and revision by the Architect. Revise as required until an approved layout and scope of included information is obtained.
- C. Once a final layout has been approved, supplier shall provide the Contractor with a full scale mounting template for proper positioning of studs and fasteners.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Plaque:
 - 1. Material: Cast Aluminum or Cast Bronze, as selected by Architect.
 - 2. Size: 18" x 24", oriented horizontally or vertically.
 - 3. Border: Standard raised double line.
 - 4. Background Texture: Sand, Stipple, or Leatherette, as selected by Architect.
 - 5. Font: Selected by Architect from all manufacturer's standard fonts.
 - 6. Typestyle: Raised copy, 1/2" size minimum, headings bold type, all others regular type.
 - 7. Background Finish: Painted, to be selected by Architect from all manufacturer's standard colors.
 - 8. Edge Color: Same as background.
 - 9. Text/Border Finish: Satin.
 - 10. Layout: Centered.
 - 11. Mounting: Blind mount with concealed studs or fasteners.
- B. Identification:
 - 1. Name of Project.
 - 2. Names of Owners.
 - 3. Name of Architect.
 - 4. Name of Engineers.
 - 5. Name of Prime Contractors.
 - 6. Date of Project.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Mount flush to wall with boss and stud concealed type mounting. Utilize manufacturer's mounting hardware as required for the type of wall surface and substrate at area of mounting. Drill hole in wall substrate and fill with silicone or construction adhesive as per the manufacturer's requirements.
- B. Mounting Height: 6'-0" to top from floor.
- C. Mount in location as directed by Architect. Verify final mounting location prior to permanent install.

SUBMITTAL CHECKLIST

- 1. Manufacturer's Literature.
- 2. Plaque Layout.
- 3. Mounting Template.

END OF SECTION 10420

SECTION 10430 - EXTERIOR SIGNS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Exterior signage as indicated on the Drawings and specified herein, including:
1. Pre-finished metal lettering.
 2. Pre-finished metal signs and placards.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 10440 - Interior Signs

1.03 SUBMITTALS

- A. Product Data:
1. Submit manufacturer's product data, cutsheets, specifications and installation details to illustrate conformance with the specifications and for selection and/or verification of all sign layout and construction items.
- B. Signage Layout:
1. Provide initial layout of signage and lettering, including the actual spacing and layout required for the surface to be installed on.
 2. Draw and indicate layout to scale, with field verified measurements included.
- C. Mounting Template:
1. Once a final layout has been approved, supplier shall provide the Contractor with a full scale mounting template for proper positioning of studs and fasteners.
- D. Samples:
1. Submit actual samples of colors as specified. Color charts alone are not acceptable.
 2. If not specified, submit samples of manufacturer's entire selection.
 3. Submit additional actual color samples as requested for selection of verification.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store letters in manufacturer's protective packaging.
B. Handle letters so as to prevent damage to finish.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Cut Metal Lettering:
1. Basis of Specification: "ASI Sign Systems", LPS Series.
 2. Material: Aluminum, 3003 H14 alloy.
 3. Thickness: 1/4", sawn.
 4. Text: As indicated on Drawings.
 5. Size: As indicated on Drawings.
 6. Font: As indicated on Drawings, or as selected from all manufacturer's standard fonts. Custom made fonts or typestyle may be required if indicated.
 7. Finish: Clear anodized or baked enamel finish as indicated on Drawings.
If not indicated, color and finish to be selected from manufacturer's entire standard color range.
 8. Mounting: Spacers for 1/2" stand-off.

2.02 SIGN SCHEDULE

- A. Material: Aluminum cut metal letters.
Text: Ag-Science & Research Farm (18" Upper case, proportional lower case)
Seymour High School (12" Upper case, proportional lower case)
Location: Mount on exterior wall at xxx. See exterior elevations for further information.
Font: Times New Roman.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Precast Wall:
1. Drill 3/16" x 1-1/2" deep holes directly in precast wall.
2. Set pins in grout.
3. Mount letters projected from wall. Use spacing collars.

SUBMITTAL CHECK LIST

1. Manufacturer's Literature.
2. Signage Layout.
3. Mounting Template.
4. Samples.

END OF SECTION 10430

SECTION 10440 - INTERIOR SIGNS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Interior non-illuminated signage as indicated on the Drawings and specified herein

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 10430 - Exterior Signs

1.03 SUBMITTALS

A. Product Data:

1. Submit manufacturer's product data, cutsheets, specifications and installation details to illustrate conformance with the specifications and for selection and/or verification of all sign layout and construction items.

B. Signage Layout:

1. Provide initial layout of signage and lettering, including the actual spacing and layout required for the surface to be installed on.
2. Draw and indicate layout to scale, with field verified measurements included.

C. Mounting Template:

1. Once a final layout has been approved, supplier shall provide the Contractor with a full scale mounting template for proper positioning of studs and fasteners.

D. Samples:

1. Submit full size samples of actual sign for each type specified.
2. Submit full size paper template of dimensional lettering signs.
3. Submit color charts for color selections.
4. Submit actual color and finish samples as requested for selection of verification.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver signs in manufacturer's unopened packages, with labels intact.

- B. Store and handle letters so as to prevent damage or deterioration

PART 2 - PRODUCTS

2.01 ROOM IDENTIFICATION SIGNS

A. Typical Flat Wall Signs:

1. Basis of Specifications: "ASI Sign Systems", InTouch.

B. Type of Graphics:

1. .080" thick matt acrylic faceplate laminated to a .080" thick acrylic back.
2. Raised etched tactile letters welded to front surface of plaque.
3. Letters and numerals shall also be included in raised braille, color same as background.
4. Copy to be centered, unless indicated otherwise.
5. Signs are to be unframed.
6. Typeface: Uppercase 3/4" high; 1-1/2" numerals shall be used for all room numbers.
7. Font: As selected from manufacturer's entire standard selection.
8. Square corners.
9. Size: 8" x 8".

2.02 COORDINATION

- A. Colors shall be selected from manufacturer's entire standard selection, panel and type.
- B. Room numbers to be determined during shop drawing submittals, unless otherwise indicated.
- C. Blank Back Plate:
 - 1. Flat and smooth panel.
 - 2. Material and color to match plaque.
 - 3. Size to match plaque.
 - 4. Provide for any sign where plaques need to be installed on a glass sidelight, transom or window, or where backside and/or mounting is otherwise exposed to view. Provide when and where directed by Architect, whether indicated or not, for location of sign installation designated.
- D. Field verify all locations of signs with Architect prior to mounting. Relocate as required.

2.03 TYPES OF SIGNS

- A. The following signs shall be provided throughout the project, whether indicated or not:
 - 1. All restrooms shall be identified by room name, pictogram, and universal symbol of accessibility.
 - 2. All janitorial and custodial rooms shall be identified by "Custodial", unless otherwise indicated.
 - 3. All mechanical and utility rooms shall be identified by "Mechanical", unless otherwise indicated.
 - 4. All electrical rooms shall be identified by "Electrical", unless otherwise indicated.
 - 5. All fire extinguishers shall be identified by universal symbol for extinguisher.
 - 6. All egress stairways shall have sign stating, "Stair" and include the universal symbol for a stairway.
 - 7. Typical sign elevations may be indicated on Drawings. See miscellaneous details on Drawings.

2.09 SIGN SCHEDULE (ROOM IDENTIFICATION SIGNS)

- A. Sign Type: A
Location: Large Equipment Training 101, Storage 104, Data 105, Water Treatment 106, Janitor 107.
Text: To be Determined
- B. Sign Type: B
Location: Food Lab 102, Office 103, Metals Lab 109, Classroom 112.
Text: To be Determined
- C. Sign Type: C
Location: Shower 113.
Text: as shown on Elevations
- D. Sign Type: D
Location: Women 114, Men 115
Text: as shown on Elevations
- E. Sign Type: E
Location:
Text: as shown on Elevations
- F. Sign Type: Exit
Location: all exterior man doors
Text: as shown on Elevations

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install all signs square, plumb, level, and true.
- B. Adhesive Attachment:
 - 1. Install using manufacturer's standard double-click foam tape, or combination of tape and adhesive.
 - 2. Use for typical installations on gypsum board or like surfaces.
- C. Fastener Attachment:
 - 1. In addition to the adhesive method above, install one screw fastener through face of sign and into the substrate at all corners. Finish paint screw heads to match face of sign.
 - 2. Use for installations on masonry walls, exterior mounting, epoxy paint or area prone to either wet or vandal conditions.
- D. Mount sign on wall adjacent to latch side of door, unless otherwise indicated.
If wall space does not permit this location, consult Architect for mounting desired.
- E. Mounting height shall be 60" above finish floor to centerline of the sign, unless otherwise indicated.
- F. Install blank back plate on opposite side of plaque where applicable.

SUBMITTAL CHECK LIST

- 1. Manufacturer's Literature.
- 2. Signage Layout.
- 3. Mounting Template.
- 4. Samples.

END OF SECTION 10440

SECTION 10500 - LOCKERS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Lockers as indicated on the Drawings and specified herein, of the following types:
1. Metal Lockers.
 2. Alternate 9A: DeBourgh Lockers
 3. Alternate 9B: Approved Lockers

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 03300 - Concrete.

Section 06100 - Rough Carpentry.

1.03 SUBMITTALS

- A. Shop Drawings:
1. Indicate sizes, dimensions, gauges, construction, trim, finish and hardware.
 2. Indicate locker numbering sequence.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver fully assembled units to site in undamaged condition, with labels intact.
- B. Store and handle materials to avoid damage and exposure to elements.
Remove damaged otherwise unsuitable material from job site.

1.05 PROJECT CONDITIONS

- A. Do not install lockers until space is enclosed and weather-proof, and until wet-work in space is completed, and until temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

PART 2 - PRODUCTS

2.01 METAL ACADEMIC LOCKERS

- A. Provide products, as approved by the Architect, from the following approved manufacturer:
1. Alternate 9A:
 - a. "DeBourgh"
 2. Alternate 9B:
 - a. "List Industries". "Superior"
 - b. "Lyon"
 - c. "Penco"
 - d. "Republic"
 - e. "ASI"
 - f. "AJW"
- B. Type and Size: Alternate 9A
1. Basis of Specification: "DeBourgh", "Corregidoor" Corridor Lockers.
 2. Dimensions: 15" wide x 15" deep x 72" high, 1-tier.
- C. Type and Size: Alternate 9B
1. Basis of Specification:
 - a. "Penco"; "Guardian Standard Lockers"
 - b. "Superior"; "Marquis Student"
 2. Dimensions: 15" wide x 15" deep x 72" high, 1-tier.

- D. Locker Body:
 - 1. Exterior Sides, Tops, Bottoms, Tier Dividers and Fascia: 16 gauge cold rolled sheet steel.
Constructed to provide continuous door strike.
 - 2. Backs: 18 gauge cold rolled sheet steel welded to frames of sides and intermediate partitions.
 - 3. Intermediate Partitions: 18 gauge cold rolled sheet steel welded to sides and intermediate partitions.

- E. Doors:
 - 1. 16 gauge steel, one piece, flanged 4 edges with 18 gauge door stiffener on hinge side of door.
 - 2. Ventilation: Secur-N-Vent doors with three-dimensional vertical vents formed on fronts and back of door providing 21% ventilation per square inch.

- F. Latching:
 - 1. Sentry III Single Point Latch
 - a. 11 gauge unbreakable stationary latch welded to the locker frame extending through no more than 1-1/4" into locker opening.
 - b. Latch protrudes through flush-mounted, recessed stainless steel cup.
 - c. Capable of accepting padlock or built-in lock.

- G. Base:
 - 1. 4" poured concrete on top of floor
 - 2. (1) #4 rebar around perimeter

- H. Tops, Bottoms, Shelves:
 - 1. 16 gauge sheet steel.
 - 2. Flanged four (4) sides

- I. Hooks:
 - 1. 3 total, 1 located on each side and back.
 - 2. Provide at each opening location.

- J. Shelf:
 - 1. Located 18" from top.

- K. Continuous Sloped Top:
 - 1. 16 gauge steel, all welded construction.
 - 2. To be installed in addition to standard flat top.
 - 3. Attach at factory with concealed fasteners.

- L. Hinges: Alternate 9A
 - 1. 16 gauge continuous piano hinge on the right side of the opening.
 - 2. Hinges welded to door and riveted to locker frame.
 - 3. Provide at each opening location.

- M. Hinges: Alternate 9B
 - 1. 5 knuckle, recessed.
 - 2. 3 on single tier.
 - 3. Provide at each opening location.

- N. Silencer:
 - 1. Air cushion rubber bumpers.
 - 2. 3 on each single tier lockers
 - 3. Provide at each opening location.

- O. Number Plate:
 - 1. Polished aluminum plate with etched black numbers; riveted.
 - 2. Numbered in sequence per Owners direction.
 - 3. Provide at each opening location

- P. Locking Device:
 - 1. Built-in recessed stainless steel hasp area for removable padlock.
 - 2. Provide at each opening location.

- Q. Finish:
 - 1. Baked enamel 2-3 mil thickness.
 - 2. Colors: Selected by Architect from manufacturer's entire selection.

- P. Handicapped Accessible Lockers:
 - 1. Quantity: 2
 - 2. Manufacturer is responsible to provide all modifications as required to meet all requirements of the accessibility Code and ADA.
 - 3. Provide all items within reach heights required.
 - 4. Provide accessible access control for entry into door without use of combination lock. May be accomplished via key fob, card swipe or other method as approved by the Architect.
 - 5. Provide universal symbol of accessibility on exterior of locker to identify locker meeting these requirements for use by disabled students.

2.07 FABRICATION

- A. Square and rigid.
- B. Interlocked intermediate cross members.
- C. All steel to have one-coat electroplated zinc carbon primer. Finish coat as specified.
- D. Fabricate filler panels from same material as locker units.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Field verify all dimensions prior to fabrication.

3.02 INSTALLATION

- A. Pour concrete base on top of floor slab. DO NOT PIN CONCRETE TO FLOOR OR WALL
- B. Install lockers in accordance with manufacturer's instructions and shop drawings.
- C. Provide all anchor bolts and other fasteners as required.
- D. Provide manufacturer's standard trim at bottom and sides.
- E. Provide filler panels as required.

3.03 ADJUSTING AND CLEANING

- A. Adjust hardware to insure that all doors operate smoothly.
- B. Clean lockers according to manufacturer's recommendations.

3.04 PROTECTION

- A. Protect lockers from damage and deterioration until Substantial completion.

SUBMITTAL CHECK LIST

- 1. Shop Drawings.
- 2. Samples.

END OF SECTION 10500

SECTION 10522 - FIRE EXTINGUISHERS AND CABINETS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Fire extinguishers, cabinets, and brackets as shown on the Drawings and specified herein.

1.02 QUALITY ASSURANCE

A. Provide fire extinguishers which are U.L. listed and bear U.L. "Listing Mark" for type, rating, and classification of extinguisher indicated.

1.03 SUBMITTALS

A. Product Data:

1. Manufacturer's product data sheets, cut sheets, specifications, materials description, installation and maintenance instructions.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to job in manufacturer's unopened packages with labels intact.

B. Store and handle products so as to prevent damage. Remove all damaged items from the job site.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Fire Extinguishers:

1. Dry Chemical Type:
 - a. Basis of Specification: "JL Industries, Inc." Cosmic 10E.
 - b. Fire Class: ABC.
 - c. U.L. Rating: 4A-80BC.
 - d. Capacity: 10 pounds.
2. Kitchen Type:
 - a. Basis of Specification: "JL Industries, Inc." Saturn 15.
 - b. Fire Class: K.
 - c. U.L. Rating: K.
 - d. Capacity: 6 liters.

B. Fire Extinguisher Cabinets:

1. Use with Dry Chemical Type Extinguishers (Semi-Recessed Mounted):
 - a. Basis of Specification: "JL Industries, Inc." Academy.
 - b. Tub: Cold rolled steel with white powder coat finish.
 - c. Trim: Semi-recessed 1-1/2" square-edge trim, aluminum, clear anodized finish.
 - d. Door Style: Full glazing.
 - e. Door Glazing: Clear acrylic with red vertical FE lettering.
 - f. Hardware: Continuous hinge, roller catch, pull handle. Match trim finish.
2. Use with Dry Chemical Type Extinguishers (Surface Mounted):
 - a. Basis of Specification: "JL Industries, Inc." Academy.
 - b. Tub: Cold rolled steel with white powder coat finish.
 - c. Trim: Square edge trim, aluminum, clear anodized finish.
 - d. Door Style: Full glazing.
 - e. Door Glazing: Clear acrylic with red vertical FE lettering.
 - f. Hardware: Continuous hinge, roller catch, pull handle. Match trim finish.

3. Use with Kitchen Type Extinguishers (Semi-Recessed Mounted):
 - a. Basis of Specification: "JL Industries, Inc." Academy.
 - b. Tub: Cold rolled steel with white powder coat finish.
 - c. Trim: Semi-recessed 1-1/4" square-edge trim, aluminum, clear anodized finish.
 - d. Door Style: Full glazing.
 - e. Door Glazing: Clear acrylic with red vertical FE lettering.
 - f. Hardware: Continuous hinge, roller catch, pull handle. Match trim finish.
 4. Provide fire rated cabinets at all Rated Walls and Smoke Partitions.
- C. Fire Extinguisher Brackets:
1. Manufacturer's standard wall mounted type for each specific extinguisher type.
 2. Provide to secure top and bottom of extinguisher.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install extinguishers in cabinets and on brackets as indicated on the Drawings.
- B. Install cabinets and brackets square and plumb, and in accordance with manufacturer's instructions.
- C. Install in compliance with all applicable Federal, State, and local regulations.
- D. Install cabinets recessed in masonry and stud framed walls as applicable.
- E. Locate wall brackets as indicated. Provide blocking as required for all attachment locations.
- F. Install cabinets and brackets so as to locate extinguishers at a height of 3'-8" from floor to top of extinguisher handle (for bracket mounted extinguishers) and to center of door pull (for extinguishers in a cabinet), unless otherwise indicated on the Drawings.

3.02 ADJUSTING AND CLEANING

- A. Check extinguishers for proper charge in operation.
- B. Assure that all doors and hardware operate smoothly and freely.
- C. Adjust or replace defective items as required.

3.03 PROTECTION

- A. Protect cabinets and extinguishers from damage and deterioration until time of Substantial Completion. Touch up any marred surfaces.

SUBMITTAL CHECK LIST

1. Product Data.

END OF SECTION 10522

SECTION 10536 – SUSPENDED PREFABRICATED ALUMINUM AWNING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Furnish labor, materials, equipment, tools, supervision and all services required to provide prefabricated aluminum awning as indicated, shown and noted on the drawings and specified herein.
- B. Drawings indicate overall profiles and dimensions only.

1.02 QUALITY ASSURANCE

- A. Comply with all applicable state and local building codes.

1.03 SUBMITTALS

- A. Shop Drawings:
 - 1. Submit shop drawings for review of profiles and overall dimensions.
 - 2. Review is to verify conformance with design intent and not for structural capability or design.
- B. Samples: Minimum 12" x 12" samples of roof deck and trim, showing finish and color specified.

1.04 DELIVER, STORAGE AND HANDLING

- A. Deliver, store and handle materials in accordance with manufacturer's recommendations, and to prevent damage and deterioration.
- B. Remove damaged material from the job site.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide products made by one of the following manufacturers or an approved equivalent:
 - 1. General Awnings
 - 2. Dittmer Architectural Aluminum
 - 3. Peach Tree Covers
 - 4. Perfection Architectural Systems
 - 5. JAG Metal Solutions

2.02 MATERIALS

- A. General Awnings, "Imperial Marquee Awning with Flat Panels"
 - 1. Basis of specification
 - 2. 888-768-8404
- B. Aluminum:
 - 1. Extrusions: 6063-T6 alloy.
 - 2. Roll formed sheets: 3003-H34.
 - 3. Finish: Powder Coat Clear
- C. Anchor bolts, nuts, and plates: A307 carbon steel, Grade A.
- D. Screws: Stainless steel with neoprene seal.

2.03 FABRICATION

- A. Fabricate deck sections of aluminum sheet, roll formed to manufacturer's standard interlocking, self-flashing, configuration.
- B. Weld beams and gutter into rigid one-piece units in the manufacturer's plant.
- C. Camber deck sections to off-set dead load deflection and assure positive drainage.
- D. Provide internal water drainage system through integral gutter.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Field verify all dimensions prior to fabrication.
- B. Field coordinate locations of all sleeves, anchor bolts and other items cast into concrete.

3.02 ERECTION

- A. Assemble and install canopy in accordance with manufacturer's drawings and installation instructions.
- B. Cap all deck ends at beam joints.
- C. Neatly execute all miter and butt joints.
- D. Where canopy adjoins other construction, provide flashing as specified in Section 07600.

SECTION 10800 - TOILET ACCESSORIES

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Toilet accessories as shown on Drawings and specified herein.
- B. Installation of owner-furnished toilet accessories as shown on Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 10171 - Solid Plastic Toilet Partitions

1.03 SUBMITTALS

- A. Manufacturer's Literature:
 - 1. Submit manufacturer's "cut sheets" for each item specified, showing installation details, and product information.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to job with manufacturer's unopened packages, with label in tact.
- B. Store and handle products so as to avoid damage. Remove all damaged items from the job site.
- C. Maintain protective covers until Substantial Completion.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide products, as approved by the Architect, from one of the following manufacturers:
 - 1. "Bobrick"
 - 2. "Bradley"
 - 3. "ASI"
 - 4. "AJW Architectural Products"
- B. See Specifications Section 01630 - Product Options and Substitutions.

2.02 MATERIALS

- A. Grab Bars:
 - 1. "Bobrick" B-6806 Series.
 - 2. Surface mounted, stainless steel, safety grip finish, concealed mounting, snap-flange cover.
 - 3. Provide 1-1/2" diameter x sizes and configurations as shown on Drawings.
 - 4. Provide at locations as shown on Drawings, or if not shown, provide as follows:
 - a. 36" long horizontally on rear wall of all ADA stalls.
 - b. 42" long horizontally on side wall of all ADA stalls and ambulatory stalls.
 - c. 18" long vertically on side wall of all ADA stalls and ambulatory stalls.
- B. Sanitary Napkin Disposals:
 - 1. "Bobrick" B-270, "Contura" Series.
 - 2. Surface-mounted, stainless steel, satin finish.
 - 3. Provide at locations as shown on Drawings, or if not shown, provide one per female water closet.
 - 4. Coordinate location with partition door and other accessories.

- C. Mirrors:
 - 1. "Bobrick" B-165 Series.
 - 2. 1/4" select float glass mirror with stainless steel angle frames.
 - 3. Corners welded, ground and polished smooth.
 - 4. Surface mounted, stainless steel, satin finish, concealed fasteners.
 - 5. Install centered on lavatory or sink.
 - 6. Provide sizes as shown on Drawings, or if not shown, provide 24"x36".
 - 7. Provide at locations as shown on Drawings, or if not shown, provide one per lavatory or sink.

- D. Frameless Mirrors:
 - 1. 1/4" select float glass mirror.
 - 2. Edges ground and polished smooth.
 - 3. Surface mounted, concealed fasteners.
 - 4. Install as shown on Drawings.
 - 5. Provide sizes as shown on Drawings.
 - 6. Provide at locations as shown on Drawings.

- E. Robe / Coat / Towel Hooks (Double Hook):
 - 1. "Bobrick" B-76727.
 - 2. Surface mounted, stainless steel, satin finish, concealed mounting.
 - 3. Provide at locations as shown on Drawings.
 - 4. Provide one on inside of each toilet partition stall door if partitions do not already include one.
 - 5. Provide two at each shower stall.
 - 6. Mount one hook at ADA height at all ADA shower stalls.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Finish surfaces shall be complete prior to installation of accessories.
- B. Verify all materials that anchoring devices are compatible with accessories.

3.02 INSTALLATION

- A. Drill holes of proper size for required anchoring devices to be concealed in finish wall behind accessories.
- B. Install accessories plumb and true.
- C. Grab Bars:
 - 1. Anchor grab bars on wall and partition of end toilet compartment and at urinals indicated.
 - 2. Install as recommended by manufacturer to withstand 500lb. downward pull.

3.03 MOUNTING HEIGHTS

- A. See Drawings for mounting heights.
- B. If not shown on Drawings, confer with Architect for heights required.
- C. All mounting heights shall meet all current Codes and ADA requirements.

3.04 ADJUSTING AND CLEANING

- A. Check operation of accessories; make final adjustment as required.
- B. Remove protective covers.
- C. Clean stainless steel of all paints, and other markings, with mild detergent and water.

3.05 PROTECTION

- A. Protect accessories from damage until Substantial Completion.
- B. Replace any damaged accessories.

SUBMITTAL CHECK LIST

- 1. Manufacturer's Literature.

END OF SECTION 10800

SECTION 11132 - PROJECTION SCREENS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Manually Operated Projection Screens as shown on the Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 06100 - Rough Carpentry
Division 16 - Electrical

1.03 SUBMITTALS

A. Submit the following:

1. Manufacturer's Literature: Materials description and installation and operating instructions.
2. Shop Drawings: Show complete details of screen, including equipment, dimensions and field measurements.

1.04 ACCEPTABLE MANUFACTURERS

A. Provide products, as approved by the Architect, from one of the following approved manufacturers:

1. "Da-Lite Screen Company, Inc."
2. "Draper Screen Company"
3. "Knox Manufacturing Company"

PART 2 - PRODUCTS

2.01 TYPE OF SCREENS

A. Manually Operated Projection Screens:

1. Provide one of the following approved products:
 - a. "Da-Lite", Model B.
2. Video (NTSC 4:3) format.
3. 69 inch height x 92 inch width, wall/ceiling mounting type.
4. Viewing surface shall be fiberglass matt white, flame retardant and mildew resistant.
5. Roller shall be of rigid metal with spline; groove construction to prevent separation of fabric from roller. Roller shall be designed so that fabric can be replaced without the use of tools, Viewing surface shall be enclosed in a steel case, flat back design, minimum 22 gage. Case shall have specially designed closure to eliminate friction between viewing surface and metal parts. To have 16 gage deep drawn chrome plated end caps with integral roller brackets. End caps shall conceal roller ends.
6. Furnish case with matching universal mounting brackets to enable surface mounting to wall or concealed attachment in ceiling. Bottom of viewing surface shall be securely mounted in tubular steel slat, finished to match case, with ends protected by shatterproof vinyl caps.
7. Screen shall include pull cord and cord cleat.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Examine all surfaces and openings and verify dimensions of in-place and subsequent construction. Installation of screens constitutes acceptance of the existing conditions.
- B. Install screens in accordance with manufacturer's instructions and approved shop drawings.
- C. Upon completion of the screen installation, instruct Owner's personnel in the operation and maintenance of the screens.

SUBMITTAL CHECK LIST

- 1. Manufacturer's Literature
- 2. Shop Drawings

END OF SECTION 11132

SECTION 11133 - VIDEO MONITOR MOUNTS

PART 1 – GENERAL

1.01 WORK INCLUDED

- A. Section Includes.
 - 1. Ceiling Projector Mounting Plate.
- B. Furnish labor, materials, equipment, special tools, supervision and services required to install the products and systems complete as shown on the Drawings and/or specified herein.
- C. All video equipment will be furnished and installed by the Owner, unless otherwise indicated.
- D. See Drawings for locations and mounting type.

1.02 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's product data sheets, cutsheets, specifications, materials description, installation and maintenance instructions.

PART 2 – PRODUCTS

2.01 MANUFACTURER

- A. "Peerless Industries, Inc."
Contact at: (800) 865-2112 or (708) 865-8870.
- B. See Specifications Section 01632 – Product Options and Substitutions.

2.02 CEILING PROJECTOR MOUNTING PLATE

- A. Model:
 - 1. "Peerless", #CMJ-455.
 - 2. 24"x24" panel to install flush within ceiling system.
 - 3. Consists of 16" x 24" ceiling tray and 8" x 24" filler tray.
 - 4. Centered mounting configuration.
 - 5. UL Listed.
 - 6. Finish: White fused epoxy.
- B. Mounting:
 - 1. 50 pound maximum load capacity.
 - 2. Wire support cables to be attached to all four (4) corners of plate location, secured to structure.
- C. Connections:
 - 1. Install one (1) electrical box with cover plate within knockout of filler tray for power.
 - 2. Install one (1) electrical box with cover plate within knockout of filler tray for data.
 - 3. Terminate power and data connections to mounting plate.
 - 4. Any box not supplied with power or data is to receive a blank cover plate.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install in strict accordance with manufacturer's installation instructions.

- B. Install in a rigid, straight, plumb and level manner.
- C. Provide all proper structural and supportive members as required.
- D. Install bracket devices to wall with anchors appropriate for the wall materials.
- E. Field verify all requirements for each and every condition present.

3.02 CLEANING

- A. Upon completion, remove all materials and equipment from the premises.
- B. Remove all trash and accumulated materials from all areas of work.

SUBMITTAL CHECKLIST

- 1. Product Data.

END OF SECTION 11133

SECTION 11450 - FOOD SERVICE EQUIPMENT

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The furnishing, delivery to the building, uncrating, setting in place, leveling and scribing to the walls or floor, utilities, rough-ins, installation and connections, as required, all food service equipment as shown on the Drawings or specified herein.
- B. Food Service Equipment Contractor (FSEC) refers to the person, company or corporation who is contracting the work of the section.
- C. The furnishing of all electrical service fixtures directly attached to the equipment, as required.
- D. The FSEC shall check the equipment in the field and will be held responsible for the proper utilities, rough-ins and connections to such equipment. The FSEC shall verify to make, model number and size of the equipment and make provisions on the rough-in drawing and shop drawing for these items.
- E. When work covered by this specification connects to equipment furnished by others, the FSEC shall check the equipment in the field and will be held responsible for the proper utilities, rough-ins and connections to such equipment. When an item is called out to be "By Owner", the FSEC shall verify to make, model number and size of the equipment and make provisions on the rough-in drawing and shop drawing for these items.
- F. Provide kitchen exhaust hood, make-up air and all associated equipment, ductwork, fire protection, components and connections for a fully functional and integrated kitchen exhaust hood system.
- G. The food service equipment, kitchen exhaust hood system and dishwash exhaust system are indicated on the Kitchen Equipment Drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

- A. Plumbing:
 - 1. Roughing-in all required services.
 - 2. Furnish and install all piping, traps, tailpieces, loop vents, stops, and related items necessary to make the final connections from the rough-in to the equipment.
 - 3. Install the following items which are furnished by the FSEC: faucets, disposers, vacuum breakers, solenoid valves, check valves, pre-rinse assemblies, hose stations, pot fillers, flow control valves, pressure reducing valves, cooling system for waste water above 110° F, filters, controls panels and related items.
- B. Electrical:
 - 1. Roughing-in all required services.
 - 2. All final connections from point of rough-in shown on the plans and specifications to the connection points on the equipment indicated on plan and specified herein.
 - 3. Furnish and install all conduit, wire, flexible conduit, cover plates, fittings as required to make provide service to point of disconnect.
 - 4. Install disconnects, plugs, chords, furnished by FSEC to make final connections to equipment.

1.03 QUALITY ASSURANCE

- A. All equipment installed under these specifications shall be manufactured and installed in strict compliance with all codes regulations, and requirements of the State Board of Health and all local Health and Sanitation Authorities, and the National Sanitation Foundation Standard #2. The Contractor shall arrange an inspection by a representative of the Indiana State Board of Health for inspection of the completed food service equipment installation. A "satisfactory report" must be received by the Owner from the State and local Boards of Health before final payment will be approved.
- B. All electric equipment shall conform to the standards of NEMA and shall be UL approved, where applicable standards have been set, or otherwise conform to the jurisdictional authorities.
- C. Fabricated equipment, described in the following itemized specifications, is required to be manufactured by one equipment manufacturer, who has the facilities to detail, and fabricate highest quality equipment in strict compliance with appropriate standards of NSF.
- D. All equipment shall carry a nameplate identifying the manufacturer and all pertinent utility information.
- E. All equipment shall be as specifically specified herein or as indicated and detailed on the drawings. Any desired substitutions or review of equivalency of equipment items must be approved by the Architect prior to bids in accordance with Section 01630 -Product Options and Substitutions.

1.04 SUBMITTALS

- A. Equipment Brochures:
 - 1. Shall include FSEC name and address, project name and location, manufacturer's data illustrations, specifications, line drawings, rough-in requirements, plumbing and wiring schematics and a list of the following information will be submitted in a neat and orderly fashion:
 - a. Item number, manufacturer and model number.
 - b. Description and dimensions.
 - c. Size, number and temperature of each water line.
 - d. Size, number and pressure of each steam line.
 - e. Size, number and CFM for each ventilation outlet.
 - f. Electrical circuits, number, voltage, phase, horsepower (HP), amperage (AMP), or kilowatts (KW) of each.
 - g. Disconnect size, manufacturer and model number.
 - h. Accessories: Include all extra, non-standard equipment.
- B. Shop Drawings:
 - 1. Equipment fabricator shop drawings prepared on a 3/4" = 1'-0" scale.
 - 2. All necessary cross-section drawings - scale at 1-1/2" = 1'-0".
 - 3. Show details of all trim required for any equipment and any special construction features.
- C. Rough-In Drawings:
 - 1. Minimum scale of 1/2" = 1'-0" (1/4" is not acceptable).
 - 2. Show dimensioned locations, heights, sizes and capacities of all mechanical, electrical and ventilating services required for each item of equipment specified and/or shown on drawings, either new or reused, and/or designated as a future item.
 - 3. Location details: Show exact locations required in the field for other trades to stub-up, stub-down, or stub-out.
 - 4. Rough-ins shall be located within a wall wherever possible, as high as possible and so as not to conflict with construction or function of building and equipment.
 - 5. Mechanical and electrical services: Show both services on sheet with outline of each piece of specified equipment shown lightly in proper location.

6. Locate drains so as to allow for swing of traps.
7. Interplumbing/interwiring: Show services to allow for interplumbing and/or interwiring of all equipment specified.
8. Duct openings: Include dimensioned layouts of all duct openings associated with hoods, dishmachines, etc., as well as ID, size and CFM of said ducts.
9. Include a separate sheet of dimensioned drawings showing:
 - a. Size and location of all concrete bases and curbs.
 - b. Wall openings for equipment.
 - c. Height of all pass-thru openings.
 - d. Floor depressions or recesses required for any equipment, including details of pit insulation and base frame installation if required.
 - e. Allied work by other contractors required for installation of equipment.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Coordinate delivery of equipment with construction progress.
- B. All equipment shall be received at the building fully protected. Protect finished surfaces from soiling and damage during handling and installation. Provide protective covering.

1.06 JOB CONDITIONS

- A. Contractor shall verify building conditions for access into the building and to the kitchen area. If it is necessary to have hoisting equipment, or remove any door, door frame, wall or window, this contractor shall assume the cost of doing this work.

1.07 GUARANTEE

- A. Provide written guarantee against defective workmanship and materials for a period of one (1) year from the date of final acceptance by the Owner.
- B. All compressors shall have an additional four (4) year warranty.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Stainless Steel:
 1. U.S. Standard gauges specified.
 2. Type 304 composition:
18% minimum chromium, 8% nickel, and 2/10th% maximum carbon.
 3. Type 430 is not acceptable.
 4. Mill finish 180 grit one side with not less than 100 grit other side.
 5. Sheets shall bear manufacturer's trademark designating type and heat number.
 6. All sheets stretcher leveled.
 7. Hard ground finish not acceptable.
- B. Galvanized Iron:
 1. Approved grade low carbon steel or copper bearing steel.
 2. Commercial quality.

- C. Hardware:
 - 1. Heavy-duty, Chrome-Plated Brass.
 - a. Walk-in door hardware shall be "Kason" or approved equal.
 - 2. Stainless steel where specified.
 - 3. All locks specified on equipment of same manufacturer, keyed alike.
- D. Sound Deadening:
 - 1. "Component Hardware", Model 075-33 NSF Approved gray latex sound deadener.
- E. Sealant:
 - 1. "Component Hardware", Model M90-101, FDA Approved clear silicone sealant.
- F. Electrical:
 - 1. Cords and plugs, neoprene type with one (1) leg grounded to framework of equipment.
 - a. 120V, single phase, 20 amp, "Hubbell", Model HBL5366C or approved equal.
 - b. 208V, single phase, 20 amp, "Hubbell", Model HBL5466C or approved equal.
 - c. Plugs shall match receptacles provided.
 - 2. All motors, heaters, etc., operating above 208/230V shall have integral transformers to provide 120V, single phase control circuits.
 - 3. Receptacles in Base Cabinets:
 - a. Cast aluminum type FD boxes with stainless steel faceplates.
 - 4. Receptacles in Tops:
 - a. Cast aluminum, satin finish, "Component Hardware", "T & S Brass" pedestal type, or approved equal, specified with stainless steel faceplates.
 - 5. Two (2) or more receptacles of same voltage in same equipment, pre-wired to common junction box for one (1) final connection, providing total load does not exceed 30 amps.
 - a. All pre-wiring done in rigid conduit.
 - b. All wires color coded and tagged.

2.02 DISPOSERS

- A. Complete with:
 - 1. 14 gauge stainless steel control brackets for mounting, constructed per drawing detail.
 - a. Brackets installed so as to allow 3" minimum clearance of control panel disconnect from front edge of roll.
 - 2. Line strainers.
 - 3. Body and/or legs mounted a minimum of 2" back from front edge.
 - 4. Chrome-plated vacuum breaker as specified in Itemized Specification.
 - 5. Chrome-plated flow control valves furnished and installed by FSEC as part of his pre connection. Fifteen (15) GPM of water shall flow into base of disposer. Ten (10) GPM of water shall flow into end of trough.
 - 6. 14 gauge stainless steel cover plates for troughs at cone, as specified in Itemized Specifications and per detail on drawings.
 - 7. 3" minimum waste line rough-in where feasible.
 - 8. Stainless steel, one-piece construction transition unit (for trough mounting) to permit direct flow into disposer, unless otherwise specified in Itemized Specifications.

2.03 FAUCETS, SPRAY UNITS AND ACCESSORIES

- A. All shall be:
1. Chrome-plated, heavy-duty brass.
 2. Equipped with removable seats.
 3. Complete with removable aerators.
 4. Complete with one (1) faucet for each sink bowl or as noted in Itemized Specifications.
 5. Faucet (if not otherwise indicated):
 - a. Backsplash-mounted,
"T&S Brass" Model B-230LN/60X with 8" swing spout, 1/2" inlet.
 - b. Top or deck-mounted,
"T&S Brass" Model B-220LN/60X with 8" swing spout, 1/2" inlet.
 - c. Backsplash-mounted,
"T&S Brass" Model B-0290 with 12" swing spout, 3/4" inlet.
 6. Check Valves (if not otherwise indicated):
 - a. Vertical – "T&S Brass" Model B-CW1-2, 1/2".
 - b. Horizontal – "T&S Brass" Model B-CVH1-2, 1/2".
 - c. Vertical – "T&S Brass" Model B-CW3-4, 3/4".
 - d. Horizontal – "T&S Brass" Model B-CVH3-4, 3/4".
 7. Pre-rinse spray assembly (if not otherwise indicated):
 - a. Deck-mounted,
"T&S Brass" Model 03-013/BR-10 consisting of Model B-0143 pre-rinse unit modified with Model B-60C hose, Model B-0970-FE backflow preventer (for continuous pressure), Model B-0109-01 wall bracket, Model BR-10 brush attachment and Model B-0512 mixing valve.
 - b. Table mounted,
"T&S Brass" Model 03-013/BR-10/B0104 consisting of Model B-0106 pre-rinse unit modified with Model B-48C hose, B-0104 hook outlet, Model B-0970-FE backflow preventer (for continuous pressure), Model BR-10 brush attachment and Model B-0512 mixing valve.
 - c. Install per detail on drawings if shown.
 8. All items shall be manufactured by one of the following:
 - a. "T & S Brass".
 - b. "Chicago Faucet".
 - c. "Fisher".
- B. Vacuum Breakers:
1. Mounted neatly above table top or backsplash, as required.
 2. "Fisher", 1/2" Model 3990 and 3991.

2.04 SINK DRAINS

- A. Minimum 2" I.P.S. or as specified.
- B. Complete with rear-connected overflow for each sink bowl.
- C. 4" long chrome-plated tailpiece.
- D. Interconnect with chrome-plated continuous waste assembly of same size as drain, where two (2) or more are mounted immediately adjacent to each other.
- E. All shall be twist handle, quick opening type unless otherwise specified.
 - 1. "Component Hardware", Model DSS-8000 stainless steel rotary drain with stainless steel twist handle assembly and Model E50-1000 overflow assembly. Furnish overflow assembly in accordance with sink size and type.
- F. Where specified furnish Component Hardware, Model D34-Y011 stainless steel box pattern waste with stainless steel basket, cover (for floor sumps).

2.05 QUICK DISCONNECT ASSEMBLIES

- A. Each of the following water hose kits shall consist of stainless steel braided hose with extruded coating, quick disconnect fitting, one (1) retractable cable, one (1) surelink restraining cable and all necessary hardware.
 - 1. "T&S Brass" Model HW-4C-*SK, 1/2" hot water inlet.
 - 2. "T&S Brass" Model HW-4D-*SK, 3/4" hot water inlet.
 - 3. "T&S Brass" Model HW-4E*SK, 1" hot water inlet.
 - 4. "T&S Brass" Model HC-4C-*SK, 1/2" cold water inlet.
 - 5. "T&S Brass" Model HC-4D-*SK, 3/4" cold water inlet
 - 6. "T&S Brass" Model HC-4E*SK, 1" cold water inlet.
 - 7. "T&S Brass" Model HC-4F-*SK, 1-1/4" cold water inlet.
 - 8. "T&S Brass" Model HC-4G-*SK, 1-1/2" cold water inlet.
- B. FSEC to field verify hose length required for each application to insure hose does not rest on floor and equipment can be moved for cleaning.

2.06 FILTERS

- A. Provide on all equipment items with a direct water connection, whether specified elsewhere or not. Specifically, all ice machines, steamers and combi-ovens shall be provided with filters.
- B. Filters do not need be provided on the dishmachine, sinks or lavatories.
- C. Equipment manufacturer shall be responsible to provide a proper filter as required with the capacity and capabilities to service the equipment load and demand as required.
- D. Locate directly adjacent to the equipment item served, installed on the water service entry side of the unit, and fully accessible for replacement and service.

2.07 WASTE WATER COOLING SYSTEM

- A. Food service equipment shall not discharge water any hotter than 140 degrees into the sanitary system.
- B. Provide on all equipment items that utilize a water connection of 140 degrees or above, whether specified elsewhere or not. Specifically, all dishmachines, booster heaters, kettles and combi-ovens shall be provided with a waste water cooling system.
- C. The equipment manufacturer of the unit being served shall be responsible to provide either internal tempering of the discharge water or a drain water tempering kit or device to accomplish the same as required to meet these requirements and the plumbing code.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Before any floor is poured, verify all roughing-in, wall openings, floor depressions, and notify the Architect of any errors, and/or omissions.

3.02 FIELD QUALITY CONTROL

- A. The equipment supplier shall provide a representative on the premises during the installation of all food service equipment and shall supervise the installation of the equipment connections.

3.03 ADJUST AND CLEAN

- A. All equipment resting against walls, floors, and/or ceilings shall be sealed to same with mastic sealer.
- B. Before final inspection, remove all protective covering from all equipment and give all items of equipment a thorough cleaning and servicing, leaving all equipment free of defects, clean and ready for operation.

3.04 SCHEDULE OF EQUIPMENT

ITEM #1 3-Compartment Sink

MFGR: "Eagle Group"

MODEL: 314 Series, 314-18-3-24

Provide and install with all standard features and specified options as follows:

- A. Construction:
 - 1. 14 gauge type 304 stainless steel top, bowls, drainboards and backsplash.
 - 2. Coved sink bowls with full 3" radius construction.
 - 3. 1-5/8"-diameter heavy gauge galvanized legs.
 - 4. Plated 12-gauge gussets welded to type 304 stainless steel reinforcing corner plates under bowls for maximum weight, support and stability.
 - 5. Type 304 stainless steel crossbracing – 1-5/8" diameter left to right; 1" diameter front to back.
 - 6. Adjustable stainless steel bullet feet.
 - 7. 9-1/2" standard backsplash includes 1" upturn and tile edge for easy installation and feathering to the wall/splash surface.
 - 8. 13" water level.
 - 9. Swirl-away drainage.

- B. Accessories:
 - 1. "T&S" #313293 faucets and lever drains, two (2) each.
- C. Sink Size:
 - 1. 20" width x 16" length x 15" depth.
- D. Utility Connections:
 - 1. See Food Service Equipment Schedule on drawings.
 - 2. Provide connection and coordination with disposer and control panel as required.

ITEM #2 2-Compartment Sink
MFGR: "Eagle Group"
MODEL: 314 Series, 314-18-2-18R

Provide and install with all standard features and specified options as follows:

- A. Construction:
 - 1. 14 gauge type 304 stainless steel top, bowls, drainboards and backsplash.
 - 2. Coved sink bowls with full 3" radius construction.
 - 3. 1-5/8"-diameter heavy gauge galvanized legs.
 - 4. Plated 12-gauge gussets welded to type 304 stainless steel reinforcing corner plates under bowls for maximum weight, support and stability.
 - 5. Type 304 stainless steel crossbracing – 1-5/8" diameter left to right; 1" diameter front to back.
 - 6. Adjustable stainless steel bullet feet.
 - 7. 9-1/2" standard backsplash includes 1" upturn and tile edge for easy installation and feathering to the wall/splash surface.
 - 8. 13" water level.
 - 9. Swirl-away drainage.
- B. Accessories:
 - 1. "T&S" #313293 faucets and lever drain.
- C. Sink Size:
 - 1. 20" width x 16" length x 15" depth.
- D. Utility Connections:
 - 1. See Food Service Equipment Schedule on drawings.
 - 2. Provide connection and coordination with disposer and control panel as required.

ITEM #3 4' Enclosed Worktable

MFGR: "Eagle Group"

MODEL: Spec-Master, Enclosed Worktable with Backsplash, CBH3048SE-BS-CS-CA

Provide and install with all standard features and specified options as follows:

- A. Construction:
 - 1. 14 gauge type 304 stainless steel tabletop, 1-1/2" rolled edge construction profile.
 - 2. Doors are 20 gauge type 430 stainless steel.
 - 3. Body is heavy gauge type 430 stainless steel.
 - 4. Sound-deaded between top and frame.
 - 5. 1-1/2" sanitary rolled rim on front.
 - 6. Square edge on ends for flush fit.
 - 7. Unit Size: 30" wide x 48" length.

- B. Accessories:
 - 1. Set of four (4) 4" high casters with brakes.
 - 2. Center shelf.

- C. Utility Connections:
 - 1. No service required.

ITEM #4 Reach-in Refrigerator, 1-Section

MFGR: Delfield or Approved Equal

MODEL: SAR1-SH

Provide and install where shown, single section, self-contained units. Units complete with all standard accessories furnished with this model.

- A. Refrigerant:
 - 1. R-134a

- B. Accessories:
 - 1. 6" high casters.
 - 2. Bottom mount electrical.

- F. Utility Connections:
 - 1. See Food Service Equipment Schedule on drawings.

ITEM #5 Reach-in Freezer, 1-Section

MFGR: Delfield or Approved Equal

MODEL: SAF1-SH

Provide and install where shown, single section, self-contained units. Units complete with all standard accessories furnished with this model.

- A. Refrigerant:
 - 1. R-134a

- B. Accessories:
 - 1. 6" high casters.
 - 2. Bottom mount electrical.

- C. Utility Connections:
 - 1. See Food Service Equipment Schedule on drawings.

ITEM #6 Electric Range

MFGR: "Electrolux"
MODEL: EW30ES80RS

Provide and install where shown, 4-burner range top and oven of standard finish, complete with all accessories furnished with this model.

- A. Construction:
 - 1. Smooth glass cooktop.
- B. Accessories:
 - 1. Side Panel Kit – A01529901
- C. Utility Connections:
 - 1. See Food Service Equipment Schedule on drawings.
 - 2. Cord and plug attached.

ITEM #7 Ice Cube Machine

MFGR: "Ice-O-Matic."
MODEL: ICEU300A

Provide and install with all standard features and specified options as follows:

- A. Construction:
 - 1. Air-cooled, self-contained, space-saving design ice maker and storage bin.
 - 2. Ice production of 309 pounds in 24 hours.
 - 3. Cube size: Dice - 7/8" x 7/8" x 7/8".
 - 4. Top-hinged front door.
 - 5. 6" high stainless steel legs.
- B. Utility Connections:
 - 1. See Food Service Equipment Schedule on drawings.
 - 2. Cord and plug attached.

ITEM #8 4' Wall Cabinet

MFGR: "Eagle Group"
MODEL: Wall Cabinet WCS-48-L

Provide and install with all standard features and specified options as follows:

- A. Construction:
 - 1. 14 gauge type 304 stainless steel, fully welded construction.
 - 2. Sloped top.
 - 3. Stationary center shelf with safety edges.
 - 3. Bi-pass sliding doors.
 - 4. Unit Size: 48" wide x 15" deep x 24" high at front, 28" high at back.
- B. Utility Connections:
 - 1. No service required.

ITEM #9 Disposer and Control Panel

MFGR: In-Sink-Erator or Approved Equal
MODEL: SS-150/AS-101

Provide and install where shown, unit of standard construction and finish, complete with all standard accessories furnished with this model, in accordance with General Specifications, and as follows:

- A. Accessories.
 - 1. Model AS-101, Aqua Saver control panel.
 - 2. Fisher, model 3990, ½" vacuum breaker in lieu of standard unit.
 - 3. Flow control valve, 7 gpm
 - 4. One year extended service/labor warranty.

- B. Performance.
 - 1. Control panel shall be recessed under top so controls do not interfere with normal operation.

- C. Utility Connections:
 - 1. See Food Service Equipment Schedule on drawings.

ITEM #10 Floor Sump

MFGR: Fabricated

Provide and install where shown, unit, 12" long x 24" wide to accommodate Item #7 (ice machine). Unit shall be constructed in accordance with detail.

- A. Construction
 - 1. 14 gauge stainless steel, all welded, one-piece construction.
 - 2. Stainless steel removable top grate (anti-slip surface).
 - 3. Box pattern waste, per General Specifications.

ITEM #11 Pre-Rinse

MFGR: "T&S Brass and Bronze Works, Inc."
MODEL: B-0133-B

Provide and install with all standard features and specified options as follows:

- A. Construction:
 - 1. Easy-install type, wall-mount mixing faucet with flex hose and overhead spray head.
 - 2. 8" center-to-center spacing with color-coded lever handles.
 - 3. 18" riser with model #004R finger hook.
 - 4. Pre-assembled spring body, overhead spring, 44" flex hose and spray valve.
 - 5. Model #B-0107 spray valve and bracket.
 - 6. Model #B-0109-01 6" wall bracket.

- B. Utility Connections:
 - 1. See Food Service Equipment Schedule on drawings.

ITEM #12 Exhaust Hood System - See specification section 12455

SUBMITTAL CHECKLIST

- 1. Equipment Brochures.
- 2. Shop Drawings.
- 3. Rough-In Drawings.

END OF SECTION 11450

SECTION 11455 - COOKLINE EXHAUST HOOD SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The furnishing, delivery to the building, uncrating, setting in place, leveling and scribing to the walls or ceiling, utilities, rough-ins, installation and connections, as required, cookline exhaust hood system , make-up air and all associated equipment, ductwork, fire protection, components and connections for a fully functional and integrated kitchen exhaust hood system as shown on the Drawings or specified herein.
- B. Food Service Equipment Contractor (FSEC) refers to the person, company or corporation who is contracting the work of the section.
- C. The furnishing of all electrical service fixtures directly attached to the equipment, as required.
- D. The FSEC shall check the equipment in the field and will be held responsible for the proper utilities, rough-ins and connections to such equipment. The FSEC shall verify to make, model number and size of the equipment and make provisions on the rough-in drawing and shop drawing for these items.
- E. The kitchen exhaust hood system is indicated on the Kitchen Equipment Drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

- A. Plumbing:
 - 1. Roughing-in all required services.
 - 2. Furnish and install all gas piping and related items necessary to make the final connections to the equipment.
 - 3. Install the following items which are furnished by the FSEC: shut off valves, pressure reducing valves and related items.
- B. Electrical:
 - 1. Roughing-in all required services.
 - 2. All final connections from point of rough-in shown on the plans and specifications to the connection points on the equipment indicated on plan and specified herein.
 - 3. Furnish and install all conduit, wire, flexible conduit, cover plates, fittings as required to make provide service to point of disconnect.
 - 4. Install disconnects furnished by FSEC to make final connections to equipment.

1.03 QUALITY ASSURANCE

- A. All equipment installed under these specifications shall be manufactured and installed in strict compliance with all codes regulations, and requirements of the State Board of Health and all local Health and Sanitation Authorities, and the National Sanitation Foundation Standard #2. The Contractor shall arrange an inspection by a representative of the Indiana State Board of Health for inspection of the completed food service equipment installation. A "satisfactory report" must be received by the Owner from the State and local Boards of Health before final payment will be approved.
- B. All electric equipment shall conform to the standards of NEMA and shall be UL approved, where applicable standards have been set, or otherwise conform to the jurisdictional authorities.
- C. All equipment shall carry a nameplate identifying the manufacturer and all pertinent utility information.

- D. All equipment shall be as specifically specified herein or as indicated and detailed on the drawings. Any desired substitutions or review of equivalency of equipment items must be approved by the Architect prior to bids in accordance with Section 01630 -Product Options and Substitutions.

1.04 SUBMITTALS

A. Equipment Brochures:

1. Shall include FSEC name and address, project name and location, manufacturer's data illustrations, specifications, line drawings, rough-in requirements, plumbing and wiring schematics and a list of the following information will be submitted in a neat and orderly fashion:
 - a. Item number, manufacturer and model number.
 - b. Description and dimensions.
 - c. Size, number and pressure of each gas line.
 - d. Size, number and CFM for each ventilation outlet.
 - e. Electrical circuits, number, voltage, phase, horsepower (HP), amperage (AMP), or kilowatts (KW) of each.
 - f. Disconnect size, manufacturer and model number.
 - g. Accessories: Include all extra, non-standard equipment.

B. Shop Drawings:

1. Equipment fabricator shop drawings prepared on a 3/4" = 1'-0" scale.
2. All necessary cross-section drawings - scale at 1-1/2" = 1'-0".
3. Show details of all trim required for any equipment and any special construction features.

C. Rough-In Drawings:

1. Minimum scale of 1/2" = 1'-0" (1/4" is not acceptable).
2. Show dimensioned locations, heights, sizes and capacities of all mechanical, electrical and ventilating services required for each item of equipment specified and/or shown on drawings, either new or reused, and/or designated as a future item.
3. Location details: Show exact locations required in the field for other trades to stub-up, stub-down, or stub-out.
4. Rough-ins shall be located within a wall wherever possible, as high as possible and so as not to conflict with construction or function of building and equipment.
5. Mechanical and electrical services: Show both services on sheet with outline of each piece of specified equipment shown lightly in proper location.
6. Locate drains so as to allow for swing of traps.
7. Interplumbing/interwiring: Show services to allow for interplumbing and/or interwiring of all equipment specified.
8. Duct openings: Include dimensioned layouts of all duct openings associated with hoods, as well as ID, size and CFM of said ducts.
9. Include a separate sheet of dimensioned drawings showing:
 - a. Size and location of all curbs.
 - b. Roof openings for equipment.
 - c. Allied work by other contractors required for installation of equipment.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Coordinate delivery of equipment with construction progress.

- B. All equipment shall be received at the building fully protected. Protect finished surfaces from soiling and damage during handling and installation. Provide protective covering.

1.06 JOB CONDITIONS

- A. Contractor shall verify building conditions for access into the building and to the kitchen area. If it is necessary to have hoisting equipment, or remove any door, door frame, wall or window, this contractor shall assume the cost of doing this work.

1.07 GUARANTEE

- A. Provide written guarantee against defective workmanship and materials for a period of two (2) years from the date of final acceptance by the Owner.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Captive Aire
B. Allied Air
C. Halton "Capture Jet"

2.02 MATERIALS

- A. Stainless Steel:
1. U.S. Standard gauges specified.
2. Type 304 composition:
18% minimum chromium, 8% nickel, and 2/10th% maximum carbon.
3. Type 430 is not acceptable.
4. Mill finish 180 grit one side with not less than 100 grit other side.
5. Sheets shall bear manufacturer's trademark designating type and heat number.
6. All sheets stretcher leveled.
7. Hard ground finish not acceptable.
- B. Galvanized Iron:
1. Approved grade low carbon steel or copper bearing steel.
2. Commercial quality.
- C. Exhaust Fan.
1. Above ceiling, in-line for wall discharge
2. Listed for use with kitchen exhaust vapors.
3. Fan to include disconnect switch, access panels and grease catch trough.
- D. Supply Fan.
1. Cabinet to be constructed of 18 gauge galvanized steel.
2. Blower inside case to be heavy gauge, rigid steel die stamped housing.
3. Preslok wheel to have sealed sleeve bearings. Drive sheave and motor base plate to be adjustable.
4. Motor to be open drip proof with ball bearings. Motor plate and bearings to be mounted on vibration isolators.
5. Factory wired three phase disconnect switch in unit cabinet to be included. Factory to install motor starters for exhaust and supply fans inside supply fan cabinet.
6. Outside air intake shroud to include four (4) washable aluminum outside air filters. Motorized backdraft damper to be mounted in unit make up air outlet. Damper to close when unit is turned off to prevent outside air infiltrating into building.
7. Exterior of fan cabinet to be painted.

- E. Hood
 - 1. Hood to be fabricated in one section.
 - 2. Hood body to be constructed of 18 gauge, type 304 stainless steel. UL Listed construction without exhaust dampers. Double thickness outside end panels solid welded and polished to face with no exposed joints.
 - 3. Grease filter frames to be stainless steel. Filter rack mullion to be tack welded to inside end panel. Integral bottom grease filter frame forms a pitched drip guard draining to a stainless steel drip pan. Furnish stainless steel Fire Fighter grease filters with stainless steel blank-off panels, as required.
 - 4. Hood lights: recessed fluorescent fixtures.
 - 5. Wireway Cover – vertical stainless steel wireway cover centered on length of hood front.
 - 6. Control Switches – Oil tight switches to control hood lights, fans on –off and heat on-off mounted on wireway cover. Provide nameplate indicating switch function. Factory to wire fixtures and switches to individual junction box on top of the hood.
 - 7. Provide bulkhead between top of hood and ceiling on all exposed sides, constructed of same material as hood body.
- F. Fire Protection System
 - 1. Furnish and install Ansul UL 300 Listed, liquid agent type. System to provide hood, duct, plenum and required surface protection.
 - 2. Exposed piping to be chrome sleeved or stainless steel.
 - 3. Mount system on end of hood in enclosed cabinet as shown on drawings.
 - 4. Furnish dual micro switch with system and mechanical gas valve to be installed by Plumber.
- G. Grinding, Polishing and Finishing:
 - 1. All joints, including field joints, unless otherwise specified, shall be welded and suitable ground flush with adjoining material and neatly finished to harmonize with same. Wherever materials have been depressed or sunken by the welding operation, such depressions shall be hammered and peened flush with the adjoining surfaces, and again ground to eliminate low spots. All ground surfaces shall be polished or buffed to match adjoining surfaces, consistent with good workmanship. Care shall be exercised in all grinding operations to avoid excessive heating of the metal and metal discoloration.
 - 2. The texture of the final polishing operations shall be uniform and smooth. The general finish of all metal shall be of a high grade. Wherever sheared edges occur, they shall be free of burrs and projections to eliminate all danger of cutting and laceration when the hand is drawn over sheared edges. Where miters of bullnose corners occur, they shall be neatly finished with the under edge of the material neatly ground to a uniform condition and in no case shall over-lapping of material be acceptable. It is the intention of the specifications to cover equipment of a high quality finish consistent with the highest grade of manufacturing practice in the industry.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Before any roughing-in or wall openings, notify the Architect of any errors, and/or omissions.

3.02 FIELD QUALITY CONTROL

- A. The equipment supplier shall provide a representative on the premises during the installation of all food service equipment and shall supervise the installation of the equipment connections.

3.03 INSTALLATION

- A. Include hanging hoods, setting fans and equipment support rail on shop drawings to be provided, fabricating and installing connecting ducts, fabricating and installing make up air plenum.
- B. Exhaust duct to be 16 gauge black iron metal. All seams to have continuous liquid-tight external welds. Furnish clean-outs, as required.
- C. Make up air duct to be 22 gauge steel, and fabricated per SMACNA low pressure standards. Make up air plenum to be installed full length of hood front at the ceiling line.
- D. Plenum to be constructed of steel, painted an off-white finish, with perforated steel face and interior diffuser.

3.04 ADJUST AND CLEAN

- A. All equipment resting against walls, floors, and/or ceilings shall be sealed to same with mastic sealer.
- B. Before final inspection, remove all protective covering from all equipment and give all items of equipment a thorough cleaning and servicing, leaving all equipment free of defects, clean and ready for operation.

SUBMITTAL CHECKLIST

- 1. Equipment Brochures.
- 2. Shop Drawings.
- 3. Rough-In Drawings.

END OF SECTION 11450

SECTION 11550 - WELDING BOOTHS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide prefabricated welding booth enclosure with strip curtains as indicated on the Drawings and specified herein.
- B. See Alternate Numbers 2 and 3.

1.02 RELATED WORK

Section 01230 – Alternates
Section 05500 - Miscellaneous Metals
Division 15 - Mechanical

1.03 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's product data sheets, cut sheets, specifications, materials description, installation and maintenance instructions.
- B. Shop Drawings:
 - 1. Show proposed method of installation, anchoring and interface between the work of this Section and the work of adjacent trades.

1.04 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide welding curtain products, as approved by the Architect, from one of the following manufacturers:
 - 1. "Avani"
 - 2. "Greene Manufacturing"

2.02 WELDING BOOTHS

- A. Basis of Specification: "Avani"
- B. Model WB-1000
- C. Description:
 - 1. Nominal booth size: 4'-0" x 4'-0" x 7'-6" tall.
 - 2. Constructed of 11 gauge 2" x 2" tubular steel frame and cross bracing with 12-gauge panels.
 - 3. Booth 1 shall be a starter unit with all sides.
 - 4. Subsequent booths to be add-on units.
 - 5. Booth to be industrial powder coated. Color to be selected.
 - 6. Back draft slotted hood equal to Avani Model WBHT-3030-10. Hood to be construction of 16 gauge steel with internal bracing to support slots.
 - 7. Provide a 24" long IP65 rated LED light fixture with fiberglass gasketed enclosure at each booth mounted overhead to the hood via a top plate extension.
 - 8. Overlapping strip curtain door on front with UV protection.
 - 9. Gas and air piping to be provided and installed in the field by the Plumbing contractor, see plumbing drawings. Electrical conduit and receptacles to be provided and installed in field by the Electrical contractor, see electrical drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Assemble and install complete where indicated on the Drawings and in full accordance with the manufacturer's recommendations, anchoring all components as per the manufacturer's recommendations.
- B. Coordination with all other trades as required to ensure proper and adequate provision in connections to exhaust system and gas piping.

3.02 INSPECTION AND ADJUSTMENTS

- A. Adjust all components for proper alignment and use.
- B. Clean and repair all marks, abrasions and scratches to make them completely invisible.

SUBMITTAL CHECKLIST

- 1. Product Data.
- 2. Shop Drawings.

END OF SECTION 11550

SECTION 12325 – PLASTIC LAMINATE CABINETS AND CASEWORK

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish and install all pre-finished, pre-fabricated, plastic-faced, cabinets and casework as shown on the Drawings and specified herein, including delivery to the site, storing, unpacking, setting in place, leveling, anchoring to walls and floors, and all other required activities need for a complete installation.
- B. Plastic laminate casework is indicated on the Equipment Drawings.
- C. Color/finish selections for plastic laminate casework/countertops are indicated on the Interior Drawings.
- D. Equipment items for plastic laminate casework are indicated on the Equipment Drawings.
- E. Solid Surface countertops as indicated on the Drawings atop plastic laminate casework.
- F. Quartz countertops as indicated on Drawings atop plastic laminate casework.
- G. Epoxy Resin countertops as indicated on Drawings atop plastic laminate casework.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 06100 – Rough Carpentry

Division 15: Plumbing and Mechanical components, connections, taps, disposals, coordination.

Division 16: Electrical components, connections, and coordination.

1.03 QUALIFICATIONS

A. Supplier's Qualifications:

- 1. Manufacturers of Plastic Laminate Cabinets and Casework should be pre-qualified prior to bidding.
- 2. Shop of manufacturer should be certified by the Architectural Woodwork Standards (AWS), and be capable of providing proof of such certification upon request.
- 3. Manufacturers wishing to be included on the pre-qualified list herein shall submit qualifications in writing to the Architect no later than ten (10) days prior to the bid.

B. Pre-qualified Manufacturers of Plastic Laminate Cabinets and Casework:

- 1. Adams Cabinetry and Installations.
- 2. Advanced Cabinet Systems, Inc.
- 3. Case Systems, Inc.
- 4. Classic Cabinets & Millwork.
- 5. Corman and Associates, Inc.
- 6. Euronique, Inc.
- 7. Four Stone Mill and Casework.
- 8. LSI.
- 9. Meyer Custom Woodworking.
- 10. P.R. Bean Company.
- 11. Smith Laminating, Inc.
- 12. Southern Cabinetry, Inc.
- 13. Stevens.
- 14. Stidham Cabinet, Inc.
- 15. Thermo Scientific Hamilton.
- 16. TMI.

1.04 QUALITY ASSURANCE

- A. Comply with the latest edition of the Architectural Woodwork Standards (AWS) "Quality Standards". References to Premium, Custom, or Economy in this specification are to be as defined in this publication.
- B. Provide items and work with a minimum of Custom Grade, with true balanced construction.

- C. Provide items and installation of straight, flat, level, plumb, and true quality and craftsmanship. Items provided that create an installation not acceptable for these reasons, or otherwise deemed unacceptable for purposes of aesthetics or maintenance, shall be removed and replaced by the Contractor without additional costs to the Owner. Final determination shall be made by the Architect.
- D. Any inconsistencies or irregularities in the surface or product will be cause for rejection. All rejected products shall be removed and replaced with new at no additional cost to the Owner. The evaluation of acceptance and rejection is at the sole discretion of the Architect.

1.05 SUBMITTALS

A. Samples:

- 1. Complete range of manufacturer's standard finishes where colors are not specified.
- 2. Samples of specified items only, where colors have been indicated.
- 3. Samples of each type, material, and color of countertop specified.

B. Shop Drawings:

- 1. Field measurements shall be taken to verify that cabinets and casework will fit into designed space. Entryways, corridors, and door openings shall be verified to ensure that the equipment be manufactured in a manner to permit it to be moved through properly into place.
- 2. Show layout of cabinets with product reference numbers, details of construction, dimensions, elevations, rough-ins, materials, finishes, hardware, and accessories.
- 3. Reference Architect's nomenclature of product identification as indicated on the Drawings.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Protect casework during transit, delivery, storage, and handling to prevent damage, soiling, and deterioration.
- B. Do not deliver casework until painting, wet work, grinding, and similar operations which could damage, soil, or deteriorate casework have been completed in installation areas.
- C. Deliver casework as needed for immediate installation whenever possible. Casework delivered ahead of time for installation shall be stored by Contractor until project areas are ready for installation.

1.07 WARRANTY

- A. Casework contractor shall guarantee to replace or repair, at no expense to the Owner, all materials of this contract found to be defective within one year of acceptance (Substantial Completion), due to defective materials and/or workmanship.

1.08 DEFINITIONS

A. Clarification:

- 1. For purposes of this specification, definitions of surfaces shall be as indicated below.
- 2. Some restrictions herein may be more restrictive or differ from the AWS Quality Standards. Where differences occur, the most restrictive specification shall take precedence.

B. Exposed Surfaces:

- 1. Any cabinet or component surface that is visible when doors and drawers are closed.
- 2. All open cabinet surfaces, shelving and components.
- 3. Cabinet surfaces, shelving and components visible through glass doors.
- 4. Bottom surfaces of all cabinets that are not concealed atop permanent construction or casework.
- 5. Top surfaces of all cabinets that are not concealed below permanent construction or casework.
- 6. Side surfaces of all cabinets that are not concealed against permanent construction or casework.
- 7. All surfaces of all cabinets that are not concealed after fixed appliances are installed.

8. Front edges of cabinets and body members that are visible.
 9. Front edges of cabinets and body members that are seen through a gap of 1/8" or greater with doors and drawers closed.
 10. Ends and toe kicks when visible after installation.
 11. Ends, back and sides of freestanding cabinets that are not permanently installed, attached to other casework, or are intended to be relocatable. These surfaces may be hidden from view in one application, but in full view in another when relocated.
- C. Semi-Exposed Surfaces:
1. Any cabinet or component surface that is visible when doors and drawers are in the open position.
 2. Any interior cabinet or component surface behind either solid doors, drawer fronts, sliding solid doors or expanded metal screen doors.
 3. Back surfaces of solid doors and drawers.
- D. Concealed Surfaces:
1. Surfaces not visible after installation of casework.
 2. Surfaces not visible when doors and drawers are open.
 3. Tops of cabinets that are to receive a counter top.
 4. Surfaces which are concealed from view and non-accessible in corners and voids created by intersection of multiple cabinets.
 5. Surfaces behind finished closure and filler panels.
 6. Stretchers, blocking and components concealed from view by drawers.
 7. Toe kicks when rubber base or like material is scheduled for installation directly to surfaces.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Hardwood Plywood: Product Standard PS 51.
- B. Softwood Plywood: Product Standard PS 1.
- C. Plastic Laminate:
1. Acceptable Manufacturers:
 - a. "Formica"
 - b. "Wilsonart"
 - c. "Nevamar"
 - d. "Pionite"
 2. Comply with NEMA LD-3 for type, thickness, color, pattern, and finish as indicated for each application.
 3. Provide high pressure laminate in grades indicated for the following types of surfaces:
 - a. Horizontal Surfaces High-pressure decorative laminate VGS-50 (0.050").
 - b. Vertical Surfaces: High-pressure decorative laminate VGS-28 (0.028").
 - c. Exposed Cabinet Body Exterior: High-pressure decorative laminate VGS-28 (0.028").
 - d. Door and Drawer Fronts: High-pressure decorative laminate VGS-28 (0.028").
 - e. Exposed Cabinet Body Interior: High-pressure decorative laminate VGS-28 (0.028").
 - f. Semi-Exposed Cabinet Body Interior: Thermally-fused melamine laminate with CL-20 cabinet liner at surface required to achieve true balanced construction, manufacturer's standard "white" in color.
 - g. Interior Concealed Surfaces: Thermally-fused melamine laminate, manufacturer's standard "white" in color.
 4. Balanced construction of both faces of surfaces is required.

5. Laminate grain patterns are to run vertically and be vertically matched within each unit.
 6. Chemical resistant type finish protection where specified, to equal or exceed the following:
 - a. "Wilsonart", "Chemsurf".
 - b. "Formica", "Chemtop".
- D. Solid Surface Material:
1. Acceptable Manufacturers and Products:
 - a. "Dupont", "Corian".
 - b. "Wilsonart", "Gibraltar".
 - c. "Formica", "Formica Solid Surfacing".
 - d. "Meganite", "Meganite".
 - e. "Avonite Surfaces", "Avonite".
 - f. "LG Hausys", "Acrylic Solid Surface".
 - g. "Hanwha L&C", "Hanex Solid Surface".
 2. 1/2" thick for countertops, installed over particleboard backer, for total thickness of 1" minimum.
 3. 1/2" thick for edge banding, built-up to provide a face depth of 1", unless indicated otherwise.
 4. 1/2" thick for backsplashes and end splashes, 4" high unless otherwise noted.
- E. Quartz Material:
1. Acceptable Manufacturers and Products:
 - a. "Dupont", "Zodiaq".
 2. 1-1/8" thick for countertops.
 3. 3/4" thick for backsplashes and end splashes, 4" high unless otherwise noted.
- F. Particleboard:
1. Industrial grade engineered board core material.
 2. 47 pound density, non-telegraphing.
 3. 3/4" thick, medium density particleboard, Type 1-M-2.
 4. 1/2" thick minimum, medium density particleboard, Type 1-M-2, under solid surfacing countertops.
- G. Accessories:
1. Filler, tops, end and side closures; finish to match adjacent cabinets and countertops.
 2. Finished back and end panels as required or indicated.
 3. Back splashes. End splashes only as specified.
- H. Shelving:
1. Fully adjustable, typically.
 2. Fixed where required for unit stability and/or positive door latching.
 3. 1" thick 36" wide or greater, 3/4" thick less than 36" wide.
 4. Shelves over 47" in length to have additional center support.
- I. Edge Trim:
1. Material:
 - a. 1mm (.020" actual) rigid PVC banding, stain finish, machine applied.
 - b. 3mm rigid PVC banding, stain finish, machine applied with 3mm radius edge profile.
 2. 3mm PVC banding at edges of doors and drawers.
 3. 3mm PVC banding at edges of countertops, including splashes, typical.
 4. 1mm PVC banding at edges of shelves, front and back.
 5. 1mm PVC banding at all other case and leading edges.

- J. Colors:
1. Colors as selected from manufacturer's entire selection, no limit on number of colors selected.
 2. If colors are indicated on the Drawings, colors and patterns must be matched.
 3. For purposes of color selections, countertops shall include all splashes, aprons, supports and cleats where no base units are provided, unless noted otherwise.
 4. For purposes of color selections, all fillers and panels shall match adjacent exposed cabinet faces.
- M. Epoxy Resin Countertops:
1. Acceptable Manufacturers and Products:
 - a. "Collegedale", Perma Resin.
 - b. "Prime Industries", Epoxy Resin.
 - c. "Laboratory Tops, Inc.", Epoxy Resin Worksurfaces.
 - d. "Durcon, Inc.", Epoxy Resin Worksurfaces.
 2. Lab grade resin tops shall be molded from modified epoxy resins and inert fillers that have been compounded and completely cured in processing to give optimum physical and chemical resistance properties required of a heavy duty laboratory table top. Tops and curbs shall be homogenous mixture throughout the full thickness and shall not depend upon a surface coating that may be removed by chemical and/or physical abuse.
 3. Thickness: 3/4" or 1" actual. Drawings based on 1" material. Adjust all dimensions if 3/4" used.
 4. Color: Black, non-glaring medium sheen.
 5. All tops shall be supplied in the largest practicable sizes and field joined using waterproof and chemical resistant epoxy base cements. Locations of seams shall be such that they are equally or evenly divided across the countertop surface. No seams shall be located at a sink or device.
 6. Countertops shall have a drip groove set back 3/8" on the underside of exposed edges.
 7. Countertops shall be truly flat, and be free of dips, sways and imperfections in the surface. Surfaces shall be 100% flat in relationship to one another at all seam locations.
 8. Determination of flatness and trueness may be evaluated for performance and aesthetics. Architect shall have sole and final determination as to acceptability of flatness and trueness.
- N. Epoxy Resin Sinks and Drain Troughs:
1. Acceptable Manufacturers and Products:
 - a. "Collegedale", Perma Resin.
 - b. "Prime Industries", Epoxy Resin.
 - c. "Laboratory Tops, Inc.", Epoxy Resin Worksurfaces.
 2. Color: Black, non-glaring medium sheen.
 3. Shall be molded from modified epoxy resins and inert fillers that have been compounded and completely cured in processing to give optimum physical and chemical resistance properties required of a heavy duty laboratory product. Shall be homogenous mixture throughout and shall not depend upon a surface coating that may be removed by chemical and/or physical abuse.
 4. Coved corners and bottom dished at least 1 degree toward outlet to assure complete drainage.
 5. High resistance to physical and thermal shock.

2.02 HARDWARE

- A. Hinges:
1. Five knuckle, 270 degree, Institutional Grade 1 hinge.
 2. Constructed of .090" minimum thickness steel.
 3. Hospital tipped with non-removable pin.
 4. 2-1/2" chrome, satin finish.
 5. Mounted to door and case with not less than three screws per wing.
 6. Concealed or with off-set wrap around wings, as selected by the Architect.
 7. Lifetime guarantee as warranted by the hardware manufacturer.

- B. Drawer Slides:
1. Standard full extension telescoping drawer slide; 3/4 extension slides are not acceptable.
 2. Self-closing epoxy coated steel drawer slide with smooth, quiet operation and lateral stability.
 3. 100 lb. static load rating, minimum. 150 lb. static load rating, minimum at all file drawers.
 4. Lifetime guarantee as warranted by the hardware manufacturer.
- C. Drawer Stops:
1. Shall be provided on all drawers to prevent inadvertent removal.
 2. Shall be automatic type, zinc plated steel.
- D. Pulls For Drawers and Doors:
1. 4" solid metal bent wire pull.
 2. Shall be of clean, modern design offering a comfortable hand grip and shall attach through drawer or door with machine screws on each end of pull.
 3. Extruded aluminum with satin lacquer finish.
 4. Install centered on all drawer fronts.
- E. Adjustable Shelf Supports:
1. Injection molded clear polycarbonate shelf support.
 2. Shall friction fit into cabinet end panels and vertical dividers and be adjustable on a 32mm center precision drilled line bore pattern.
 3. Shall have 2 integral 5mm diameter support pins to interface pre-drilled holes, and to prevent accidental rotation of support.
 4. Shall automatically adapt to 3/4 inch or 1 inch thick shelving and provide a non-tip feature for shelving.
 5. 250 lb. minimum static load rating per support without failure.
 6. Shelves longer than 47" shall have additional support standard and brace at center span.
- F. Door and Drawer Locks:
1. Locks shall be furnished on all doors and drawers throughout, unless indicated otherwise.
 2. Locks shall be standard disc tumbler with removable core (cam style), master keyed and furnished with two keys per lock.
 3. Locks used for double door applications shall be capable of securing both doors simultaneously without the need for additional elbow or deadbolt catches or bolt on the passive door.
 4. Furnished with two keys per lock. Master key as required.
 5. Unless otherwise specified, key casework per the following requirements:
 - a. Science labs shall have all doors and drawers keyed individually within room with a master key for entire room.
 - b. All other spaces shall have all doors and drawers keyed alike within entire room.
 - c. Provide grandmaster key to operate all locks of all master keys for all spaces.
- G. Door Catches:
1. Heavy duty magnetic type catch.
 2. Shall have matching white plastic coated housing and dual floating magnet poles.
 3. Holding strength of 5kg.
 4. Doors less than 48" in height shall have 1 magnetic catch mounted at either the top or bottom of each door.
 5. Doors over 48 inches in height shall have 1 magnetic catch mounted at both the top and bottom of each door.
 6. Doors shall receive a matching steel strike plate attached with threaded fasteners.

- H. Tall Case Latching Assembly:
 - 1. Provide at all tall case double swinging doors.
 - 2. Shall consist of an eccentric plate operating two 1/8" x 5/8" plated vertically operating locking bars.
 - 3. Each bar shall operate through an extruded nylon guide and, when locked, shall engage a strike plate providing positive latching for the left hand door.
 - 4. The lock attached to the right hand door shall operate a bolt which, when locked, shall overlap the left hand door providing secure locking.
 - 5. Single doors shall be locked to case sides.
- I. Silencers:
 - 1. Cork, plastic, or rubber type silencers.
 - 2. Provide on all drawers and doors.
- J. Chain Stops:
 - 1. Shall be provided at the top of all doors to all tall cabinets.
 - 2. Provide chain stops at the top of all doors to all base and wall cabinets that open directly into a wall surface or obstruction.
 - 3. Finish of chains and stops to match hinges.

2.03 FABRICATION

- A. Base:
 - 1. Continuous under all base and storage cabinets.
 - 2. Rubber base furnished and installed per Section 09650.
- B. Countertops:
 - 1. 1" thick, plastic laminate faced, with PVC covered edge.
 - 2. Thicknesses as specified for all other countertop materials.
 - 3. Continuous 4" x 3/4" back and end splashes, unless otherwise noted, to match countertop material.
 - 4. Aprons, size and locations as shown on drawings.
If not indicated on drawings, provide 4" apron along all exposed edges of all countertops in locations where without base cabinets.
- C. Drawers:
 - 1. Shall be constructed so as to provide full solid sides and components for the entire box.
 - 2. Sides composed of no solid panel or of simply the guide or sliding hardware is not acceptable.
- D. Joinery:
 - 1. Handwrap fluted dowel construction.
 - 2. 8mm minimum.
 - 3. Doweled and glued.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Assure adequate anchorage, grounds, blocking, nailers, and supports.
- B. Assure that plumbing and electrical rough-ins are complete.

3.02 INSTALLATION

- A. Install casework plumb with top level.
- B. Anchor cabinets to floors and walls.
- C. Install fillers, trim, sinks and accessories required for complete installation.
- D. Touch up all marred surfaces to match original.
- E. Replace any items or surfaces damaged during shipping, delivery, storing, installation, or construction activities.
- F. Coordinate sinks and other items that are to be installed in casework so as to insure that they will fit into casework as intended. Obtain templates for items prior to fabrication of bases or countertops. Coordinate needed changes to cabinets to allow for items specified without additional costs to the Owner.

SUBMITTAL CHECK LIST

- 1. Samples.
- 2. Shop Drawings.

END OF SECTION 12325

SECTION 12502 - WINDOW SHADES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work covered by this section includes furnishing of and paying for all materials, labor, equipment, mounting hardware and other items required for execution and completion of roll-up fabric window shades.
- B. Work covered by this Section includes:
 - 1. Single-Roller Window Shades, with a screen fabric shade.

1.02 SUBMITTALS

- A. Window Shades Schedule:
 - 1. Indicate locations, quantities and field measurements of dimensions for all window blinds.
 - 2. Indicate proposed mounting and fastening procedurals.
- B. Product Data:
 - 1. Manufacturer's product data sheets, cutsheets, specifications, materials description, installation and maintenance instructions.
- C. Samples:
 - 1. Actual samples of all items needed for colors and finishes.
 - 2. Colors and finishes to be selected by Architect from manufacturer's entire selection.

1.03 DELIVERY

- A. Deliver materials in manufacturer's original, unopened, containers, labeled so as to allow easy identification.

1.04 WARRANTY

- A. Chain and Clutch Operator – Five (5) years.

PART 2 – PRODUCTS

2.01 SINGLE ROLLER WINDOW SHADES

- A. Provide one of the following approved products:
 - 1. "Hunter Douglas Contract", FR Roller Shade.
 - 2. "Draper", Flexshade.
 - 3. "MechoSystems", Mecho/5 Manual Shades.
- B. Description:
 - 1. Manually operated, vertical roll-up, fabric window shade with bead chain and clutch operating mechanism.
- C. Mounting Style:
 - 1. Inside of window opening and extending from head to sill and jamb to joint.

- D. Operation:
 - 1. Bead chain and clutch operating mechanism allowing shade to stop when chain is released.
 - 2. Designed never to need adjustment or lubrication.
 - 3. Provide preset limit stops to prevent shade from being raised or lowered too far.
 - 4. Clutch mechanism to be fabricated from high carbon steel and molded fiberglass reinforced polyester or injected molded nylon.
 - 5. Control loop to be stainless steel bead chain hanging at side of window.
- E. Fascia:
 - 1. L-shaped aluminum extrusion to conceal shade roller and hardware.
 - 2. Finish: Baked enamel.
 - 3. As indicated on the Drawings, or if not indicated, to be selected by Architect from manufacturer's entire selection.
- F. Color:
 - 1. As indicated on the Drawings, or if not indicated, to be selected by Architect from manufacturer's entire selection.

2.02 SCREEN FABRIC

- A. Basis of Specification: "Sheerweave" 2000.
- B. Description:
 - 1. Interior sun control, PVC coated fiberglass woven full basketweave.
- C. Attributes:
 - 1. Weight: 14.26 ounces per square yard
 - 2. Thickness: .019 inches
 - 3. Roll Width: 96 inches
 - 4. Openness: 5 percent
 - 5. Class A Fire Rating
 - 6. Bacteria and fungal resistant.
- D. Color:
 - 1. As indicated on the Drawings, or if not indicated, to be selected by Architect from manufacturer's entire selection.

PART 3 - EXECUTION

3.01 INSPECTION AND PREPARATION

- A. Contractor shall be responsible for inspection of site, approval of mounting surfaces, installation conditions and field measurements for this work.
- B. Field measure all openings and conditions.

3.02 INSTALLATION

- A. Install shades level and plumb, allow clearance for proper operation, and demonstrate blinds to be in uniform and smooth working order.
- B. Provide clearance between sash and shades to permit unencumbered operation of sash hardware.

- C. Isolate metal parts from concrete and mortar to prevent galvanic action.
- D. Protect installed units to ensure their being in operating condition, without damage, blemish, or indication of use at Substantial Completion of project. Correct non-conforming damaged unit. Replace units that cannot be field corrected.

3.03 CLEANING

- A. Clean finished installation of dirt and finger marks. Leave work area clean and free of debris.

SUBMITTAL CHECK LIST

- 1. Window Shades Schedule.
- 2. Product Data.
- 3. Samples.

END OF SECTION 12502

SECTION 13850 - FIRE DETECTION AND ALARM SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. This specification describes a fire detection and alarm system. The control panel, to be intelligent device addressable, analog detecting, low voltage and modular, with digital communication techniques, in full compliance with all applicable codes and standards.
- B. The Contractor shall furnish a complete system that meets or exceeds the minimum requirements, features and capacities as indicated on the Drawings and specified herein.
- C. The system shall be in full compliance with National and Local Codes and requirements.
- D. The system shall include all required hardware, piping, raceways, interconnecting wiring and software to accomplish the requirements of this specification and the contract drawings, whether or not specifically indicated.
- E. 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.
- F. The system as specified shall be supplied, installed, tested and approved by the local Authority Having Jurisdiction, and turned over to the Owner in a functional and operational condition.
- G. In the interest of job coordination and responsibilities, the 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.
- H. Furnish all labor, materials, equipment, special tools, supervision and services required.
- I. All products supplied shall be non-proprietary. Any items that are supplied or installed that are proprietary to a specific system shall be removed and replaced with non-proprietary materials at no additional costs to the Owner.

1.02 DESCRIPTION OF SYSTEM

- A. System shall be fully addressable.
- B. This section includes providing a complete and operative fire alarm system in the project as indicated on the drawings, specified herein and elsewhere required.
- C. System shall consist of control panel, remote annunciator panel, manual stations, fire alarm signals, automatic smoke and heat detectors, fan shutdown relays, conduits, boxes, wire, etc. All electrical work shall conform to applicable sections of these specifications except where specified otherwise.
- D. System shall be actuated by any automatic or manual initiating device, or the kitchen hood system, which shall immediately sound all alarm devices continuously until actuating device is restored to normal and control panel is reset. System shall automatically shut down all air supply and exhaust fans and automatically restart this equipment when the system is returned to normal. Operation of any alarm initiating device shall be indicated on its associated alarm zone and any trouble with the wiring or device shall be indicated as its associated trouble zone.

- E. System shall include an automatic dialer to send a fire alarm signal to an approved alarm receiving facility who shall notify the designated parties of the alarm condition.
- F. System shall be designed for direct-current (DC) and shall be supplied with standby battery supply and automatic battery charging system. System shall be designed for connection to a 120 volt dedicated (AC) circuit.

1.03 APPROVALS

- A. The publications listed below form a part of this publication to the extent referenced. The publications are referenced in the text by the basic destination 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. National Fire Protection Association (NFPA)
 - a. Maintenance of Sprinkler Systems.
 - b. NFPA 70 National Electrical Code.
 - c. NFPA 72, Standard for Installation, Maintenance and use of protective signaling systems.
 - 2. American with Disabilities Act.
 - 3. Underwriters' Laboratories, Inc. (UL)
 - a. UL FPED
 - b. A.D.A. Federal Guidelines
 - 4. State and local building codes as adopted by the Authority having jurisdiction.

1.04 QUALIFICATION OF INSTALLER

- A. Before commencing work, submit data showing that the manufacturer has successfully installed fire alarm systems of the same scope, type and design as specified. The contractor shall include the names and locations of at least two installations where the manufacturer has installed such systems.
 - 1. The Contractor shall submit copies of all required licenses and bond as required in the state having jurisdiction.
 - 2. The installing contractor shall employ on staff a minimum of one NICET level 3 technician or a professional engineer, registered in the State of the project location.

1.05 QUALIFICATION OF MANUFACTURER

- A. Provide the services of a factory trained and certified representative or technician, experienced in the installation and operation of the type of system provided. The representative shall be licensed in the State if required by law. 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.
- B. Contractor shall maintain a factory trained service department with service personnel available on a 24 hour, 7-day per week basis. Provide a 24-hour emergency service number with a maximum telephone response time of 1 hour.
- C. Contractor shall maintain a spare parts inventory of critical function components.
- D. Contractor's personnel shall have a minimum of 2 year's experience in service and maintenance of fire detection, and alarm systems.

1.06 SUBMITTALS

- A. The Contractor shall include, at a minimum, the following information:
 - 1. Power calculations. Battery capacity calculations. Battery size shall be minimum of 125% of the calculated requirement.
 - 2. Supervisory power requirements for all equipment.

3. Alarm power requirements for all equipment.
4. 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.
5. Voltage drop calculations for wiring runs demonstrating worst-case condition.
6. Complete manufacturers catalog data including supervisory power usage, alarm power usage, physical dimensions, and finish and mounting requirements.
7. Complete drawings covering the following shall be submitted by the contractor for the proposed system:
 - a) The submittals shall include drawings (in CAD compatible format) showing a schematic arrangement of the system including the main control unit and all peripherals. The drawing shall show the type, quantity and arrangement of all modular components within the control unit and shall indicate overall cabinet dimensions. The drawings shall show explicit details regarding the positioning and placement of all detection system components. The drawing shall also include building floor plans drawn to a minimum scale of 1/8" = 1'-0".
 - b) Floor plans shall show all equipment and raceways, marked for size, conductor count with type and size, showing the percentage of allowable National Electric Code fill used.
 - c) Provide a fire alarm system function matrix as referenced by NFPA 72. 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.
8. Installation drawings shop drawings, and as-built drawings shall be prepared by an individual who is experienced with the work specified herein.
9. Incomplete submittals shall be returned without review, unless with prior approval of the Engineer.

1.07 INSTALLATION SUPERVISION

A. Supervision:

Shall include services of factory trained technicians to supervise installation of systems during construction, to assist in the system start-up and to inspect systems during guarantee period. Make a complete inspection at the end of the guarantee period, and forward signed statement of inspection after all corrections and maintenance items have been completed, to Architect/Engineer. This report will be filed with the project records.

B. Testing:

Submit on completed of work, verification of a point-by-point check test indicating the date and time of each item inspected. Issue a certificate conforming that the inspection has been completed and the system is installed and functioning in accordance with the specifications. This report will be filed with project records and in the bound "Maintenance and Operations Manual".

1.08 SERVICE GUARANTEE

- A. Submit satisfactory evidence that there is a fully equipped, local service organization within Seventy-Five (75) miles of the project that is capable of rendering adequate inspection and service to equipment within three (3) hours after notification including standard part replacement. This organization shall be an authorized dealer for the equipment furnished on this project and prepared to offer service contract for maintenance of equipment after guarantee period.

1.09 OPERATION AND MAINTENANCE INSTRUCTIONS

- A. Give complete oral and printed instructions to operating personnel, who will verify to Architect/Engineer that they are fully aware of operation and maintenance of equipment.
- B. Furnish bound copies of "Operation and Maintenance Manual".

- C. Include operation instructions, wiring and schematic diagrams of equipment, one-line diagram of system, complete servicing data, part numbers and voltage charts, and internal wiring diagrams of component equipment.
- D. The fire alarm system contractor or manufacturer shall offer for the owner's consideration and evaluation at the time of system submittal, a priced inspection, maintenance, testing and repair contract in full compliance with the requirements of NFPA 72H.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide a complete system by one of the following manufacturers, or an approved equivalent:
 - 1. "Siemens"
 - 2. "Tyco/Simplex Grinnell"
 - 3. "Edwards/GE Security"
 - 4. "Notifier"

2.02 FIRE ALARM CONTROL PANEL (FACP)

- A. Equal to: "Tyco/Simplex Grinnell" #4008-9121.
- B. Control unit shall be semi-recessed in the wall, modular design, dead front construction using solid state electronic components. Alarm initiating shall meet all requirements of NFPA 72A for limited energy applications and function with up to 1500 ohms resistance through alarm initiating devices, contacts and associated wiring. Control panel with annunciator shall be recessed, flush with the finished wall. Enclosing cabinet shall be red in color.
- C. Auto Dialer shall be digital type, dual-telephone line capability, capable of monitoring and reporting up to eight supervised circuits. Unit shall include battery, transformers, enclosure, etc., for a complete functional unit.
- D. Include LCD annunciated circuit-specific character custom labels with LED indicator points visible in front face of cabinet.
- E. Control panel shall contain internal trouble signals with silencing switches, system reset switch, system test switch and shall be supervised so that trouble signal shall indicate in event of loss of either operating or standby power.
- F. Annunciators shall be provided in face of control unit and shall indicate when both operating and standby power circuits are energized.
- G. Trouble signal silencing switches shall be provided one each zone with associated pilot lights so that faults initiating and alarm circuits can indicate trouble and be silenced independently. Trouble signals shall automatically restore to normal condition. Separate pilot lights shall be provided for each signal circuit. Relays used for sounding alarm and trouble signals shall have coils electrically supervised and sound trouble signal in event of open coil.
- H. Alarm Verification:
System shall include alarm verification for all smoke detectors, that is after a 30 second delay the system automatically resets itself and only sounds an alarm if the same detector initiates an alarm with 60 seconds. This feature shall have no effect on other initiating devices including other smoke detectors.

- I. Control panel shall be furnished with minimum point capacity of 200 initiating devices. Initiating devices shall be any combination of smokes, pull stations, heat detectors, duct detectors, control modules or monitor modules.
- J. Maintenance Alert:
Control panel shall continuously monitor the sensitivity of each smoke and heat detector and be capable of reporting maintenance conditions when dirty, dusty, faulty or in need of attention.
Control panel shall make notification via remote dialer.
- K. All pilot and indicating lamps shall be light-emitting diodes (LED) or (LCD) for long life.
- L. Control panel shall be fully addressable.

2.03 FIRE ALARM ANNUNCIATOR PANEL (FAAP)

- A. Equal to: "Tyco/Simplex Grinnell" #4603-9111.
- B. Annunciator shall be remote from the control panel in location as directed by the Architect.
Annunciators shall be LCD remote annunciator with the same control functions as the main control panel operator interface. Trim shall be either stainless steel or aluminum, brushed, clear finish.
- C. All pilot and indicating lamps shall be light-emitting diodes (LED) or (LCD) for long life.
- D. Zone alarm signal shall be illuminated whenever associated alarm initiating device is activated and zone trouble signal shall be illuminated whenever associated zone circuit is open or shorted out.
- E. Test switch test all circuit components including lamps.
- F. Reset Switch:
Shall be necessary to restore alarm initiating device to normal and manually activate system reset switch to extinguish annunciator alarm signal.
- G. Silencing of a trouble signal when fault occurs on any alarm zones shall not prevent resounding of trouble signal in event of subsequent fault condition of other zones, alarm signal circuits, or loss of either source of power.
- H. Wiring Supervision:
All field wiring connected to alarm initiating devices shall be electrically supervised and single opening or ground shall not cause illumination of any alarm signal.

2.04 STANDBY BATTERY AND CHARGER

- A. Standby battery and charger shall be incorporated in Control Panel and shall be furnished to sound alarms in the event of loss of normal power. Batteries shall have sufficient capacity to sound alarms for five (5) minutes after 24 hour power interruption.
- B. Charger shall use solid-state circuitry and shall be capable of recharging battery fully within 12 hours. Under normal charging, charger shall charge battery at high rate and automatically switch to low maintenance rate charge when battery is fully charged. Charger shall contain both voltmeter and ammeter of 5% accuracy.
- C. Pilot light shall be provided and remain on to indicate 120 volt AC power source. In event of loss of 120 volt AC power, a trouble signal shall sound. An amber signal indicator shall be used to show that trouble signal has been silenced.

- D. Battery charger circuit shall be current limited to prevent damage in event of a short circuit on battery leads.

2.05 MANUAL ALARM STATIONS

- A. Equal to: "Tyco/Simplex Grinnell" #4099-9001.
- B. Manual Alarm Boxes shall be single acting, non-coded, semi-flush mounted, break rod feature, mechanically latched when actuated, and key reset to normal position. Rod shall not be required to maintain normal position. Construction shall be molded modern design, red finish, with instructions in raised white letters.
- C. Provide twenty-five (25) spare glass rods at control panel location.

2.06 VISUAL ALARM DEVICES

- A. Equal to:
 - 1. "Tyco/Simplex Grinnell" True Alert #4906-9204 (Ceiling Type)
 - 2. "Tyco/Simplex Grinnell" True Alert #4906-9201 (Wall Type)
- B. Description:
 - 1. Shall be furnished per the drawings.
 - 2. Multi-candela strobe.
 - 3. Ceiling-mounted or wall-mounted unit as and where indicated.
 - 4. Housing color White, "Fire" lettering Red (Ceiling Type).
Housing color Red, "Fire" lettering White (Wall Type).
 - 5. Provide candela ratings in compliance with the Code, ADAAG and NFPA 72, 2002.
 - 6. Xenon strobe with a minimum repetition rate of 1 HZ, not exceeding 3 HZ and a maximum duty cycle of 40% with a pulse duration of .2 seconds.
 - 7. Unfiltered or clear filtered white light.
 - 8. Devices shall be synchronized in each line of sight per ADA.
- C. Installation and Requirements:
 - 1. Devices shall be mounted at a height of 80 inches above the highest level of the finish floor or 6 inches below the ceiling, whichever is lower.
 - 2. Devices shall be located no further than 15'-0" from the end of any corridor.
 - 3. Installation heights and locations shall comply with the ADA.

2.07 AUDIBLE/VISIBLE ALARM DEVICES

- A. Equal to:
 - 1. "Tyco/Simplex Grinnell" True Alert #4906-9230 (Ceiling Type)
 - 2. "Tyco/Simplex Grinnell" True Alert #4906-9227 (Wall Type)
- B. Description:
 - 1. Shall be furnished per the drawings.
 - 2. Horn with multi-candela strobe.
 - 3. Ceiling-mounted or wall-mounted unit as and where indicated.
 - 4. Housing color White, "Fire" lettering Red (Ceiling Type).
Housing color Red, "Fire" lettering White (Wall Type).
 - 5. Provide candela ratings in compliance with the Code, ADAAG and NFPA 72, 2002.
 - 6. Xenon strobe with a minimum repetition rate of 1 HZ, not exceeding 3 HZ and a maximum duty cycle of 40% with a pulse duration of .2 seconds.
 - 7. Unfiltered or clear filtered white light.

8. Devices shall be synchronized in each line of sight per ADA.
9. Provide a minimum of 15 db above ambient sound levels.

C. Installation and Requirements:

1. Devices shall be mounted at a height of 80 inches above the highest level of the finish floor or 6 inches below the ceiling, whichever is lower.
2. Devices shall be located no further than 15'-0" from the end of any corridor.
3. Installation heights and locations shall comply with the ADA.

2.08 SMOKE DETECTORS

- A. Smoke detectors shall be photo-electric type completely solid state with light emitting diode and shall not use any ware filament vacuum tubes.
- B. Duct type smoke detectors shall be provided in all air handling units above 2,000 CFM in the return side and both on the return and supply side in units above 15,000 CFM. Duct type detectors shall be provided with remote indicating pilot lights and test switches, mounted 4'-0" above the floor. Verify exact location with Architect/Engineer.
- C. Ceiling type smoke detectors shall be combination heat and smoke sensing type, provided with indicating pilot light and test switches.
- D. Smoke Detectors which operate electromagnetic door holders, air handling units, roll-down screens, etc. shall be provided with two sets of contacts. One set shall release the door or screen, shut down the air handling unit; the other set shall sound a general fire alarm.
- E. Provide one smoke detector on each side of every door held by electromagnetic door holders, wherever holders are indicated. Provide smoke detectors whether or not they are indicated on the Drawings.
- F. Provide one smoke detector on each side of every smoke damper, wherever smoke dampers are indicated. Provide smoke detectors whether or not they are indicated on the Drawings.
- G. Smoke detectors indicated with audible base shall have capability of two distinct alarm conditions. Upon activation of the smoke detector chamber a supervisory signal shall be annunciated at the fire alarm panel. Upon thermistor and smoke detector activation a general alarm condition shall be sounded.
- H. Smoke detector audible bases shall contain a mini horn capable of 85 dB at 10 feet.

2.09 HEAT DETECTORS

- A. Heat detectors shall be ceiling mounted employing two independent methods of detection.
- B. All units shall be combination units detecting a fixed temperature rating of 135 degrees F (57 degrees C) and a rate-of-rise of 15 degrees F (8.3 degrees C) per minute spaced a maximum of 50 ft. on center.
- C. Fixed temperature units shall detect a fixed temperature rating of 190 degrees F (88 degrees C) spaced a maximum of 15 ft on center. Install in mechanical rooms, kitchens and cooking spaces.

2.11 PROTECTIVE GUARDS AND COVERS

- A. Shall be clear, tamperproof, UV stabilized polycarbonate shield and frame specially designed to custom fit the specific fire alarm devices they protect. Shields to be slotted for all types of audible devices.
- B. If allowed by the Architect, chrome plated heavy wire guards may be used in lieu of polycarbonate shields.

- C. In areas where to be installed, install on all manual alarm stations, alarm signals, smoke detectors, heat detectors, etc.
- D. Areas of installation to include all spaces prone to impact on a regular basis such as, mechanical rooms, custodial rooms, storage rooms and similar spaces.

PART 3 - EXECUTION

3.01 DESIGN AND INSTALLATION DRAWINGS

- A. Show a general layout of the complete system including equipment arrangement. It shall be the responsibility of the fire alarm contractor to verify dimensions and assure compatibility all other systems interfacing with the fire alarm system.
 - 1. Identify on the drawings, conduit and conductor sizes and types with number of conductors in each conduit. Provide each conduit and device with a unique identification for addressable alarm initiation devices, the system identifier shall be the system address for that device.
 - 2. Indicate on the point to point wiring diagrams, interconnecting wiring within the panel between modules and connecting wiring to the field device terminals.

3.02 DEMOLITION

- A. Contractor shall remove all the existing system components. All components, devices and wiring installed shall be new.
- B. Contractor shall coordinate the work so that the Fire Alarm System, either new or existing, is in full operation while building is occupied by the public.
- C. Should it become necessary to make the existing Fire Alarm Systems inoperative, ample notification shall be given to the Owner, and the Architect/Engineer. Architect/Engineer will issue additional written instructions that are to be provided at this Contractor's expense.
- D. All existing fire alarm equipment shall remain the property of the Owner and shall be stored off-site by the Contractor at a central location where directed by the Owner.

3.03 WIRING

- A. Fire alarm system wiring shall be installed with open plenum fire coded cable. Install wire neatly with bridal rings along walls. Maximum spacing 5'-0". Wire shall be of the size and type as recommended by system manufacturer but not smaller than #14 AWG. Wire shall be color coded throughout and tagged at each box and in the equipment cabinet for identification.

3.04 IDENTIFICATION

- A. Fire alarm wiring in equipment cabinets shall be terminated on marked terminal strips. Tag wiring at both ends to correspond with wiring diagram. Arrange wire neatly in cabinets and lace with nylon cable straps. Cable terminations shall be arranged so that sections of the system may be isolated for servicing.

3.05 END OF LINE RESISTORS

- A. End of Line Resistors shall be in separate outlet box in mechanical, electrical or storage space or above the corridor ceiling. Mark and locate on system drawings.

3.06 CONNECTIONS

In addition to the alarm devices specified here, other connections to the fire alarm system shall include but not limited to, the following:

- A. From the fire alarm control panel, provide a connection to each manual alarm station, to each audio and visual alarm device and to each automatic detection device.
- B. From the fire alarm control panel, provide connection to each fan motor controller.
- C. From the fire alarm control panel, provide a connection to each kitchen hood system.
- D. From the fire alarm control panel, provide a connection to the automatic dialer to the telephone terminal board.
- E. From the fire alarm control panel, provide a connection to each electromagnetic door holder and access control power supplies and connection equipment.
- F. From the fire alarm control panel, provide connection to each automatic fire sprinkler system device; Including but not limited to: riser flow, riser tamper, PIV, pit valves, zone valves, etc.

3.07 INSTALLATION

- A. Perform work in accordance with the requirements of NEC, NFPA 70 and NFPA 72.
- B. New devices can be surface mounted on existing walls.

3.08 CERTIFICATE OF COMPLIANCE

- A. Complete and submit to the Project Architect in accordance with NFPA 72, paragraph 2.2.2.

3.09 CLEANING

- A. Vacuum clean inside of all boxes, cabinets and equipment when work is complete.

SUBMITTAL CHECKLIST

- 1. Manufacturer's catalog data cut sheets.
- 2. Complete full size installation drawings.
- 3. Power calculations.

END OF SECTION 13850

SECTION 15001 – GENERAL MECHANICAL REQUIREMENTS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions Specification sections, apply to work of this section.

1.02 SUMMARY

- A. This Section specifies the basic requirements for mechanical installations and includes requirements common to more than one section of Division 15. It expands and supplements the requirements specified in sections of Division 1.

1.03 CODES AND STANDARDS

- A. All work shall be done in accordance with all State, County and City Building Regulations and Codes.
- B. All equipment and work under this Section shall also conform to the following regulations, codes, and standards.
 - 1. OSHA
 - 2. NFPA
 - 3. SMACNA Standards for Sheet Metal Work
 - 4. Indiana Mechanical Code
 - 5. Indiana Plumbing Code
 - 6. Model Energy Code, ASHRAE Standard 90.1 (Latest)
- C. These regulations are considered a part of the specifications and shall prevail should they differ with plans and specifications. Prior to bid submission, the Contractors should direct the Engineer's attention to the difference. Should the Contractor not so notify the Engineer, the Contractor shall fully comply without claim for extra costs.

1.04 DRAWINGS

- A. Drawings: Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. The Contractor shall carefully investigate the plumbing, fire protection, electrical, structural and finish conditions that would affect the work to be performed and shall arrange such work accordingly, furnishing required ductwork offsets, fittings, and accessories to meet such conditions.
- B. Design Concepts: The Drawings indicate capacities, sizes, and dimensional requirements of system components and are based on the specific types, manufacturers, and models indicated. Components having equal performance characteristics by other manufacturers may be considered provided that deviations in dimensions, operation, and other characteristics are minor and do not change the design concept or intended performance as judged by the Architect. The burden of proof of equality of products is on the proposer. Refer to Division 1 Section "Product Substitutions."

GENERAL MECHANICAL REQUIREMENTS

1.05 MUTUAL COOPERATION OF SEPARATE SUB-CONTRACTORS

- A. It shall be the responsibility of each separate Sub-contractor to notify any and all separate Contractors at the proper time for the installation of the other Contractors' work, where the operations of such Contractor would "cover-up" or render the installation of the work of the other Contractor impossible: such notice to be given in writing in the event that it is found necessary to proceed prior to the installation of the work by the other Contractor.

1.06 ASSIGNMENT OF MISCELLANEOUS WORK

- A. Openings in walls and floors required for this section of work shall be by the Contractor installing the work, unless specifically noted otherwise on the plans. Each Contractor or his Subcontractor will be responsible for exact locations, of piping and ductwork. If work is completed without proper notification of locations by each Contractor, all cost of cutting and patching must be paid by the Contractor in fault.
- B. Roof Openings are to be cut by the Contractor for HVAC related items, and plumbing related items. All curbs and flashings are to be furnished, set, and anchored by the responsible Contractor in cooperation with the General Contractor. On projects involving new roofs, the General Contractor shall strip-in the curbs to be watertight. The responsible mechanical contractor shall seal penetrations on existing roofs. If an existing roof is under warranty, the responsible mechanical contractor shall provide assurances that his work shall not compromise the roof warranty.
- C. Painting. Each Contractor will provide prime painting on all ferrous metals such as supporting steel. Wall repairs for sleeve installation, etc. shall be painted to match existing.
- D. Pads, Foundations and Concrete Trenches for equipment or drainage shown on the architectural or structural plans shall be by the General Contractor. All others shall be constructed by the Mechanical Contractor. Any change from sizes shown on the plans due to substitution, etc., must be verified with the General Contractor. All imbedded anchors, sleeves, or hangers must be provided by Mechanical Contractor.
- E. Platforms and Supporting Stands for equipment shall be furnished by each responsible Contractor unless noted otherwise.
- F. Excavation and Backfill for all work in this Section shall be done by this Contractor in accordance with the Specification of Division 02 covering this type of work. Any cutting of existing surface such as floor or pavement, and backfilling of trenches shall be done by this Contractor with material of same quality and thickness as the existing. Mechanical Contractor shall be responsible for trenches and voids associated with mechanical construction. The architectural plans shall indicate the extent of the patching assigned to the General Contractor. All other patching shall be by the responsible mechanical contractor.
- G. Electrical power and control wiring will be done by the Electrical Contractor under Section 26, except temperature control wiring which shall be provided by Mechanical Contractor. Each Contractor will furnish all required wiring diagrams and manufacturer's data required to perform this work. The Electrical Contractor will provide all disconnects, unless they are furnished with the equipment by the equipment manufacturer. Each Contractor to provide all controls (temperature, pressure level, etc.) and install same if attached or inserted into pipe or duct systems.

GENERAL MECHANICAL REQUIREMENTS

1.07 MECHANICAL/ELECTRICAL COORDINATION

- A. The mechanical contractor and each vendor of mechanical equipment shall review the equipment schedules and wiring diagrams shown on the plans for accuracy and completeness prior to submitting base bid. The mechanical contractor and his vendors shall inform the engineer of any discrepancies prior to submission of bids. Failure to so inform the engineer shall be an acceptance on the part of the mechanical contractor and vendors of any liability for errors or omissions concerning mechanical and electrical coordination.

1.08 ACCESSIBILITY

- A. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.
- B. Unless specifically noted otherwise, ceiling and wall access panels shall be provided by the mechanical contractor.
- C. Extend all grease fittings to an accessible location.

PART 2 - PRODUCTS (Not Used)

PART 3- EXECUTION

3.01 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected. This shall include rough-in of ductwork.

3.02 MECHANICAL INSTALLATIONS

- A. Coordinate mechanical equipment and materials installation with other building components.
- B. Verify all dimensions by field measurements.
- C. Arrange for chases, slots, and openings in other building components to allow for mechanical installations.
- D. Coordinate the installation of required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed.
- E. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing-in the building.
- F. Coordinate the cutting and patching of building components to accommodate the installation of mechanical equipment and materials.
- G. Where mounting heights are not detailed or dimensioned, install mechanical services and overhead equipment to provide the maximum headroom possible.

GENERAL MECHANICAL REQUIREMENTS

- H. Install mechanical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
- I. Coordinate the installation of mechanical materials and equipment above ceilings with suspension system, light fixtures, and other installations.
- J. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

3.03 CUTTING AND PATCHING

- A. This Article specifies the cutting and patching of mechanical equipment, components, and materials to include removal and legal disposal of selected materials, components, and equipment.
- B. Refer to Division 16 “Basic Electrical Requirements” for requirements for cutting and patching electrical equipment, components, and materials.
- C. Do not endanger or damage installed Work through procedures and processes of cutting and patching.
- D. Arrange for repairs required to restore other work, because of damage caused as a result of mechanical installations.
- E. No additional compensation will be authorized for cutting and patching Work that is necessitated by ill-timed, defective, or non-conforming installations.
- F. Perform cutting, fitting, and patching of mechanical equipment and materials required to:
 - 1. Uncover Work to provide for installation of ill-timed Work;
 - 2. Remove and replace defective work;
 - 3. Remove and replace Work not conforming to requirements of the Contract Documents;
 - 4. Remove samples of installed Work as specified for testing;
 - 5. Install equipment and materials in existing structures;
 - 6. Upon written instructions from the Architect/Engineer, uncover and restore Work to provide for Architect/Engineer observation of concealed Work.
- G. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

3.04 MECHANICAL SUBMITTALS

- A. Refer to the Conditions of the Contract (General and Supplementary) and Division 1 “Submittal Procedures” for submittal definitions, requirements, and procedures.
- B. Submittal of shop drawings, product data, and samples will be accepted only when submitted by The Contractor. Data submitted from subcontractors and material suppliers directly to the Architect/Engineer will not be processed.

3.05 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Refer to the Instructions to Bidders and the Division 1 "PRODUCTS AND SUBSTITUTION" for requirements in selecting products and requesting substitutions.

3.06 PRODUCT LISTING

- A. When two or more items of same material or equipment are required (pumps, valves, air conditioning units, etc.) they shall be of the same manufacturer. Product manufacturer uniformity does not apply to raw materials, bulk materials, pipe, tube, fittings (except flanged and grooved types), sheet metal, wire, steel bar stock, welding rods, solder, fasteners, motors for dissimilar equipment units, and similar items used in Work, except as otherwise indicated.
- B. Provide products which are compatible within systems and other connected items.

3.07 NAMEPLATE DATA

- A. Provide permanent operational data nameplate on each item of power operated mechanical equipment, indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data. Locate nameplates in an accessible location.

3.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.
- B. Coordinate deliveries of mechanical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

3.09 RECORD DOCUMENTS

- A. Mark Drawings to indicate revisions to piping and ductwork, size and location both exterior and interior; including locations of coils, dampers and other control devices, filters, boxes, and similar units requiring periodic maintenance or repair; actual equipment locations, dimensioned for column lines; actual inverts and locations of underground piping; concealed equipment, dimensioned to column lines; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.); Change Orders; concealed control system devices.
- B. Mark Specifications to indicate approved substitutions; Change Orders; actual equipment and materials used.

3.10 OPERATION AND MAINTENANCE DATA

- A. In addition to the information required by Division 1 for Maintenance Data, include the following information:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.
2. Manufacturer's printed operating procedures to include start-up, break-in, routine and normal operating instructions; regulation, control, stopping, shut-down, and emergency instructions; and summer and winter operating instructions.
3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.

3.11 WARRANTIES

- A. Unless specifically noted otherwise, warranties shall be as specified in Contract General Conditions.
- B. Compile and assemble the warranties specified in Division 15, into a separated set of vinyl covered, three ring binders, tabulated and indexed for easy reference.
- C. Provide complete warranty information for each item to include product or equipment to include date of beginning of warranty or bond; duration of warranty or bond; and names, addresses, and telephone numbers and procedures for filing a claim and obtaining warranty services.

3.12 CLEANING

- A. Refer to Division 15 Section "TESTING, ADJUSTING, AND BALANCING" for requirements for cleaning filters, strainers, and mechanical systems prior to final acceptance.

3.13 FACTORY START-UPS

- A. Some major items of equipment shall be started up by or with the direct supervision of a technician commonly engaged in such work who is employed by the manufacturer, factory-authorized in writing or whose credentials are approved in writing by the Architect/Engineer. These items shall include as a minimum:
 1. Temperature Control System
- B. Architect/Engineer shall be notified one week in advance of the date and time of the start-ups.
- C. Submit a complete start-up report to Architect/Engineer within two weeks of start-up and at least two weeks prior to final review.
- D. When specified in individual specification sections manufacturer shall be required to provide an 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.

3.14 CONTRACTOR START-UPS

- A. The Architect/Engineer shall be notified at least three working days in advance of the start-up of each system.

- B. Before starting or operating equipment or systems certify to the Architect/Engineer that all systems have been properly flushed, cleaned and tested. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence or other conditions which may cause damage. Verify that tests, meter readings and specified electrical characteristics agree with those required by the equipment or system manufacturer and that all manufacturer's check lists and instructions have been followed. Verify wiring and support components for equipment are complete and tested.
- C. Execute start-up under supervision of responsible Contractor's personnel in accordance with manufacturer's instructions. Satisfy requirements of this section and other individual specification sections for procedures.

END OF SECTION 15001

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SECTION 15010 – COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Transition fittings.
 - 3. Dielectric fittings.
 - 4. Mechanical sleeve seals.
 - 5. Sleeves.
 - 6. Escutcheons.
 - 7. Grout.
 - 8. Equipment installation requirements common to equipment sections.
 - 9. Painting and finishing.
 - 10. Concrete bases.
 - 11. Supports and anchorages.
 - 12. Excavation for utility trenches.

1.03 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for rubber materials:
 - 1. EPDM: Ethylene-propylene-diene terpolymer rubber.
 - 2. NBR: Acrylonitrile-butadiene rubber.
- G. The following industry abbreviation for plastic materials:
 - 1. PVC: Polyvinyl chloride plastic.

1.04 SUBMITTALS

- A. Product Data: For the following:
 - 1. Transition fittings.
 - 2. Dielectric fittings.
 - 3. Mechanical sleeve seals.
 - 4. Escutcheons.
- B. Welding certificates.

1.05 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.07 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for plumbing installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Coordinate requirements for access panels and doors for plumbing items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

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 manufacturers specified.

2.02 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 15 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.03 JOINING MATERIALS

- A. Refer to individual Division 15 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated.
- F. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.04 TRANSITION FITTINGS

- A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
 1. Available Manufacturers:
 - a. Cascade Waterworks Mfg. Co.
 - b. Dresser Industries, Inc.; DMD Div.
 - c. Ford Meter Box Company, Incorporated (The); Pipe Products Div.
 - d. JCM Industries.
 - e. Smith-Blair, Inc.
 - f. Viking Johnson.
 2. Underground Piping NPS 1-1/2 and Smaller: Manufactured fitting or coupling.
 3. Underground Piping NPS 2) and Larger: AWWA C219, metal sleeve-type coupling.

4. Aboveground Pressure Piping: Pipe fitting.
- B. Flexible Transition Couplings for Underground Nonpressure Drainage Piping: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.
 1. Available Manufacturers:
 - a. Cascade Waterworks Mfg. Co.
 - b. Fernco, Inc.
 - c. Mission Rubber Company.
 - d. Plastic Oddities, Inc.

2.05 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and no lead ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F .
 1. Available Manufacturers:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Company.
 - c. Eclipse, Inc.
 - d. Epco Sales, Inc.
 - e. Hart Industries, International, Inc.
 - f. Watts Industries, Inc.; Water Products Div.
 - g. Zurn Industries, Inc.; Wilkins Div.
- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
 1. Available Manufacturers:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Company.
 - c. Epco Sales, Inc.
 - d. Watts Industries, Inc.; Water Products Div.
- E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
 1. Available Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Central Plastics Company.
 - d. Pipeline Seal and Insulator, Inc.
 2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.

2.06 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
 - 1. Available Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
 - 2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 3. Pressure Plates: Carbon steel. Include two for each sealing element.
 - 4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.07 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - 1. Underdeck Clamp: Clamping ring with set screws.
- E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
- F. PVC Pipe: ASTM D 1785, Schedule 40.

2.08 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Stamped-Steel Type: With set screw and chrome-plated finish.
- D. Split-Plate, Stamped-Steel Type: With concealed hinge, set screw, and chrome-plated finish.
- E. One-Piece, Floor-Plate Type: Cast-iron floor plate.
- F. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.09 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psi 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

2.10 PIPE RESTRAINTS

- A. As required per code.
- B. Available Manufacturers:
 - 1. Holdrite.

PART 3 - EXECUTION

3.01 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 15 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
 - c. Insulated Piping: One-piece, stamped-steel type with spring clips.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
 - f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece or split-casting, cast-brass type with polished chrome-plated finish.
 - g. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge and set screw.
 - h. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type with concealed or exposed-rivet hinge and set screw or spring clips.
 - i. Bare Piping in Equipment Rooms: One-piece, stamped-steel type with set screw or spring clips.
 - j. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.

- M. Sleeves are not required for core-drilled holes.

- N. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

- O. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
 - b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
 - 1) Seal space outside of sleeve fittings with grout.

 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and

location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.

- P. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using 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.
 - 1. Install steel pipe for sleeves smaller than 6 inches in diameter.
 - 2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
 - 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- Q. Verify final equipment locations for roughing-in.
- R. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.02 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 15 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

- I. Join PVC piping according to ASTM D2665.
- J. Join PEX tubing using manufacturer's recommended fittings and joining methods.

3.03 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
 - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
 - 3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
 - 4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.04 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

3.05 PAINTING

- A. Painting of plumbing systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting."
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.06 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor plumbing materials and equipment.
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

3.07 GROUTING

- A. Mix and install grout for plumbing equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.

- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

3.08 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
 - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
 - 1. Clearance: 12 inches each side of pipe or conduit.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 - 1. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
 - 2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
 - 3. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- D. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.
 - 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.09 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.
 - 1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

3.10 STORAGE OF SOIL MATERIALS

- A. Stockpile borrowed soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Surveying locations of underground utilities for Record Documents.
 - 2. Testing and inspecting underground utilities.
 - 3. Removing trash and debris.
 - 4. Removing temporary shoring and bracing, and sheeting.
 - 5. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.12 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Backfill trenches excavated within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 03 Section "Cast-in-Place Concrete."
- D. Place and compact initial backfill of subbase material, free of particles larger than 1 inch (25 mm) in any dimension, to a height of 12 inches over the utility pipe or conduit.
 - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- E. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches over the utility pipe or conduit.
- F. Backfill voids with satisfactory soil while installing and removing shoring and bracing.
- G. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- H. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.
- I. Install warning tape directly above exterior utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.13 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows: Delete subparagraphs below not required. Revise soil materials to suit Project. Other soil materials, such as a drainage course or subbase or base courses, may still be required over fill.
 - 1. Under building slabs, use engineered fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.14 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
 - 1. Under building slabs, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
 - 2. For utility trenches, compact each layer of initial and final backfill soil material at 95 percent.

3.15 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect/Engineer.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
 - 1. Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2000 sq. ft. (186 sq. m) or less of building slab, but in no case fewer than 3 tests.
 - 2. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet (30 m) or less of wall length, but no fewer than 2 tests.
 - 3. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet (46 m) or less of trench length, but no fewer than 2 tests.

- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.16 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.
 - 1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

3.19 PLUMBING PIPE MATERIAL SCHEDULE

Service	Material	Joint
Sanitary waste inside above floor	Schedule 40 PVC	Primed, solvent weld
Sanitary waste inside below floor	PVC Schedule 40 DWV	Primed , solvent weld
Domestic Water Supply above floor	Copper	Soldered
Natural Gas	Sch 40 steel	Threaded
ACU Cond. Drain	Type "M" Copper	Soldered
Oxygen & Argon Gas	Type "K" Copper	Brazed
Acetylene Piping	Schedule 40 Steel	Welded or Threaded

3.20 VALVE SCHEDULE

- A. See Division 15 Section "General Duty Valves."

Notes: 1. No-lead silver solder is to be used on domestic water lines.

END OF SECTION 15010

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SECTION 15082 – PLUMBING INSULATION-GENERAL

PART I – GENERAL

1.01 SUMMARY

- A. Section includes general provisions common to mechanical insulation work.
- B. Applicable general provisions in this Section govern insulation work the same as if repeated in respective complementary Sections.
- C. Provide materials, transportation, labor, and services and insulate respective mechanical work in compliance with provisions herein and in respective system and equipment Insulation Sections and in compliance with notes on Drawings.
- D. Fire stopping provisions in Section 15010 and Division 07 govern fire stopping at mechanical work penetrations of fire resistive and fire rated construction.
- E. Related sections include the following:
 - 1. Division 15 Section 15083 “Mechanical Insulation”.

1.02 REFERENCES

- A. Following standards form a part of mechanical insulation specifications to the extent indicated by references made thereto:
 - 1. American Society of Testing Materials (ASTM).
 - 2. Underwriters' Laboratories (UL).

1.03 SUBMITTALS

- A. Submit product data for insulation, jackets, coverings, adhesives, sealants, cements and other materials to be installed on this Project. List materials and thickness for each service application.
- B. Provide shop and installation drawings of field fabricated covers. Samples of products may be required at A/E/D's request.

1.04 QUALITY ASSURANCE

- A. Applicator: A company specializing in, and experienced in mechanical equipment and systems insulation application. (Insulation Contractor)
- B. Fire Performance Characteristics: Insulation, facings, cements, and adhesives shall have 25/50 maximum flame spread/smoke developed rating in accordance with ASTM E84, except insulation outside may be rated 75/150 maximum. Insulation shall be tested by and bear label of U.L. or other testing organization acceptable to authority having jurisdiction.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products in unopened factory packaging.

- B. Protect adhesives, mastics, cements, etc., from freezing.
- C. Protect insulating materials from moisture.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selections:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.02 INSULATION MATERIALS - GENERAL

- A. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- B. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- C. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

2.03 PIPING INSULATION MATERIALS

- A. Mineral-Fiber, Preformed Pipe Insulation(MFPP)
 - 1. Description: Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ or with factory-applied ASJ-SSL. Factory-applied jacket requirements.
 - 2. Material Properties:
 - a. Density: Minimum 3 ½ lb/ft³
 - b. Maximum Service Temperature: 660° F rating.
 - c. K Factor: 0.25 Btu.in/(hr.ft².Deg.F) at 100°F.
 - d. Flame spread: 25 max composite rating.
 - e. Smoke Developed: 50 max. composite rating.
 - f. Fuel Contributed: 50 max. composite rating.
 - g. Water Vapor Transmission: 0.02 perms with jacket.
 - 3. Products:
 - a. Fibrex Insulations Inc.: Coreplus 1200
 - b. Johns Manville: Micro-Lok
 - c. Knauf Insulation: 1000 (Pipe Insulation)
 - d. Manson Insulation Inc.: Alley-K
 - e. Owens Corning: Fiberglas Pip Insulation
- B. Flexible Elastomeric: (FE)
 - 1. Description: Closed-cell rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
 - 2. Material Properties:
 - a. Density: Minimum 3.0 lb/ft³
 - b. Maximum Service Temperature: 200°F

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- c. K-Factor: 0.276 but-in.hr.ft².Deg.F at 90° mean temperature
- d. Flame spread: 25 maximum
- e. Smoke Developed: 50 maximum
- f. Water Vapor Transmission: 0.08 perms.

- 3. Products:
 - a. Aeroflex USA Inc.: Aerocel
 - b. Armacell LLC: AP Armaflex
 - c. RBX Corporation: Insul-Sheet 1800 and Insul-tube 180.

2.04 FIELD-APPLIED JACKETS

- A. Reference Specification Section 15083.

PART 3 – EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Before installing insulation, verify that respective work to be insulated is complete, has been tested and cleaned, and is ready to be insulated. Use tarpaulins or other coverings to protect equipment, uncovered piping, ductwork, etc. from dirt and rubbish which may be caused by insulation installation operations.
- B. Prior to starting insulation installation operations and while performing work, verify that environmental conditions are within manufacturer's recommendations for sealants, tapes, and other adhesives to be used.

3.02 INSTALLATION OF INSULATION, GENERAL

- A. Insulation Work: Performed by qualified tradesmen, following manufacturer's written instructions for respective products, in compliance with applicable building codes and industry standards. (Insulation Contractor).
- B. Install insulation over clean, dry surfaces only.

3.03 FIELD APPLIED JACKET INSTALLATION

- A. Apply PVC jackets on exposed piping up to 6'-0" A.F.F.

3.04 PIPING INSULATION SCHEDULE

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Plumbing Pipe Insulation Schedule:

Item	Type	Thick-ness	Thickness in attics & all un-Conditioned Spaces	Vapor Retarder Required?	Number of Layers	(2) Field Applied Jacket	Notes:
Domestic Cold Water < 2"	MFPP	1/2"		Yes	1		
2 1/2" and larger	MFPP	1"		Yes	1		
Domestic Hot Water < 2"	MFPP	1"		Yes	1		
2 1/2" and larger	MFPP	1-1/2"		Yes	1		

MFPP = mineral fiber pre-formed pipe insulation; FE = flexible elastomeric

END OF SECTION 15082

SECTION 15083 – MECHANICAL INSULATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes mechanical insulation for HVAC duct, plenum, equipment, pipe, breeching, and plumbing equipment and pipe; insulating cements; field applied jackets; accessories and attachments; and sealing compounds as follows:
1. Insulation Materials:
 - a. Flexible elastomeric
 - b. Mineral fiber
 2. Fire-rated insulation systems.
 3. Factory-applied jackets.
 4. Field-applied jackets.
- B. Related Sections include the following:
1. Division 15 Section 15815 "Metal Ducts" for duct liners.
 2. Division 15 Section 15060 "Hangers and Supports for Mechanical Piping and Equipment".

1.03 SUBMITTALS

- A. Product Data. Submit manufacturer's technical product data and installation instructions for each type of product indicated. Submit schedule showing manufacturer's product number, thermal conductivity, k-value, thickness, density in lbs/cu.ft., furnished accessories and jackets (both factory and field applied, if any) for each mechanical system requiring insulation.

1.04 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.
1. Insulation Installed Indoors: Flame-spread rating of 25 or less and smoke-developed rating of 50 or less.
 2. Insulation Installed Outdoors: Flame-spread rating of 75 or less and smoke-developed rating of 150 or less.
 3. Mechanical Insulation: Pipe insulation installed inside buildings shall conform to the requirements of the *International Energy Conservation Code*, shall be tested in accordance with the ASTM E 84, using the specimen preparation and mounting procedures of ASTM E 2231; and shall have a minimum flame spread index of 25 and a smoke-developed index not exceeding 450.

Insulation materials installed in an air plenum shall be noncombustible or shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E 84.

Exceptions:

- a. Rigid and flexible ducts and connectors shall conform to Section 603 of the 2006 International Mechanical Code.
 - b. Duct coverings, linings, tape and connectors shall conform to Sections 603 and 604 of the 2006 International Mechanical Code.
 - c. This criteria does not apply to materials exposed within plenums in one-and two-family dwellings.
 - d. This criteria does not apply to smoke detectors.
 - e. Combustible materials enclosed in noncombustible raceways or enclosures, approved gypsum board assemblies or enclosed in materials listed and labeled for such applications.
4. Duct Insulation: Shall conform to requirements of Sections 604.2 through 604.13 of the 2006 International Mechanical Code and the *International Energy Conservation Code*. Note: The following Articles are from the 2006 International Mechanical Code and by reference are included as part of this specification.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.02 INSULATION MATERIALS – GENERAL

- A. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- B. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- C. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- D. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

2.03 PIPING INSULATION MATERIALS

- A. Mineral-Fiber, Preformed Pipe Insulation:

1. Description: Type I, 850 deg F (454 Deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ or with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in Part 2 "Factory-Applied Jackets" Article.
 2. Material Properties:
 - a. Density: Minimum $3 \frac{1}{2}$ lb/ft³.
 - a. Maximum Service Temperature: 650 °F rating
 - b. K Factor: 0.25 Btu.in/(hr.ft².Deg.F) at 100 °F.
 - c. Flame spread: 25 max. composite rating.
 - d. Smoke Developed: 50 max. composite rating.
 - e. Fuel Contributed: 50 max. composite rating.
 - f. Water Vapor Transmission: 0.02 perms with jacket.
 3. Products:
 - a. Fibrex Insulations Inc.: Coreplus 1200
 - b. Johns Manville; Micro-Lok
 - c. Knauf Insulation, 1000 (Pipe Insulation)
 - d. Manson Insulation Inc., Alley-K
 - e. Owens Corning; Fiberglas Pipe Insulation
- B. Flexible Elastomeric:
1. Description: Closed-cell rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
 2. Material Properties:
 - a. Density: Minimum 3.0 lb/ft³
 - b. Maximum Service Temperature: 220°F
 - c. K-Factor: 0.276 Btu-in./hr.ft².Deg.F. @ 90°F mean temperature.
 - d. Flame spread: 25 maximum
 - e. Smoke Developed: 50 maximum
 - f. Water Vapor Transmission: 0.08 perms.
 3. Products:
 - a. Aeroflex USA Inc.; Aerocel
 - b. Armacell LLC; AP Armaflex
 - c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180

2.04 DUCTWORK INSULATION MATERIALS

- A. Mineral-Fiber Blanket Insulation:
1. Description: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in Part 2 "Factory-Applied Jackets" Article.
 2. Material Properties:
 - a. Density: Minimum 1.5 lb/ft³.
 - b. Maximum Service Temperature: 250° F.
 - c. K-Factor: 0.26 Btu-in./(hr.ft². Deg. F). @ 100°F mean temperature.
 - d. Flame Spread: 25 maximum.
 - e. Smoke Developed: 50 maximum.
 - f. Water Vapor Transmission: 0.7 perms with FSK.

3. Products:
 - a. Johns Manville; Microlite
 - b. Knauf Insulation; Duct Wrap
 - c. Mason Insulation, Inc.; Alley Wrap

- B. Mineral-Fiber Board Insulation:
 1. Description: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. In mechanical equipment rooms where exposed and on outdoor air intake duct, intake plenums, relief plenums and duct from the relief plenum back to the shutoff/relief damper. Provide insulation with factory-applied FSK jacket.

 2. Material Properties:
 - a. Density: Minimum 3.0 lb/ft³.
 - b. Maximum Service Temperature 450°F.
 - c. K-Factor: 0.24 Btu-in./(hr.ft².Deg.F) @100° F mean temperature.
 - d. Flame Spread: 25 maximum.
 - e. Smoke Developed: 50 maximum.
 - f. Water Vapor Transmission: 0.02 perms with FSK.

 3. Products:
 - a. Certain Teed Corp.; Commercial Board.
 - b. Johns Manville; 800 Series Spin-Glas.
 - c. Knauf Insulation; Insulation Board.
 - d. Owens Corning; Fiberglass 700 Series.

2.05 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
 1. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

2.06 FIELD-APPLIED JACKETS

- A. General ASTM C921, Type 1, unless otherwise indicated.

- B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
 1. Products:
 - a. Johns Manville; Zeston.
 - b. P.I.C. Plastics, Inc.; FG Series.
 - c. Proto PVC Corporation; LoSmoke.
 - d. Speedline Corporation; SmokeSafe.

 2. Thickness: 0.060"
 3. Adhesive: As recommended by jacket material manufacturer.
 4. Color: White
 5. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

MECHANICAL INSULATION

6. Factory-fabricated tank heads and tank side panels.
7. Jacket shall be sized to fit snugly and match pipe insulation thickness.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
 1. Verify that systems and equipment to be insulated have been tested and are free of defects.
 2. Verify that surfaces to be insulated are clean and dry.
 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
 1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils (0.127 mm) thick and an epoxy finish 5 mils (0.127 mm) thick if operating in a temperature range between 140 and 300 deg F (60 and 149 deg C). Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
 2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F (0 and 149 deg C) with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
- C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.03 COMMON INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes according to the manufacturers written instructions with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules at the end of this section.

3.04 DUCT AND PLENUM INSULATION INSTALLATION

- A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

- B. Board Applications for Ducts and Plenums: Secure board insulation with adhesive and anchor pins and speed washers.

3.05 DUCT SYSTEM APPLICATIONS

- A. Insulation materials and thickness are specified in schedules at the end of this Section.

3.06 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this Article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
 - 1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
 - 2. For services not specified to receive a field-applied jacket except for flexible Elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

3.07 FIELD-APPLIED JACKET INSTALLATION

- A. Attachment General Requirement: No staples are to be used.
- B. Where PVC jackets are indicated, install with 1-inch (25-mm) overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturers recommended adhesive.

3.08 DUCT INSULATION SCHEDULE

- A. Plenums and Ducts Requiring Insulation:
 - 1. Indoor, concealed supply and outdoor air.
 - 2. Indoor, exposed supply and outdoor air.
 - 3. Indoor, exposed return located in non-conditioned space.
 - 4. Outdoor, concealed supply and return.
- B. Items Not Insulated:
 - 1. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1. (Includes medium pressure ductwork between air handlers and VAV boxes and all acoustically lined ductwork.)
 - 2. Factory-insulated flexible ducts.

C. HVAC Duct Insulation Schedule:

Item	Type	Thickness	Thickness in attics & all un-Conditioned Spaces	Vapor Retarder Required?	Number of Layers (Note 1)	Field Applied Jacket	Notes:
Supply Air Duct	MFBrd	1"	N/A	Yes	1	No	(5)
Concealed supply air duct	MFBLK	1"	2"	Yes	1	No	2
O/A ducts and plenums	MFBrd	2"	2"	Yes	1	No	
Return ducts	IL as noted on plans	1"		No	1	No	
Exposed supply air duct	None						(3)
Heat only	None						
Abbreviations:							
MFBlnk: Mineral Fiber Blanket							
MFBrd: Mineral Fiber Board							
IL: Internally lined							
Notes:							
1.) Combined thickness of layers shall result in thickness requirement shown.							
2.) 2" MFBrd at locations shown on drawings							
3.) Refer to Section 15815 "Metal Ducts".							
4.) paint with UV resistant coating.							

END OF SECTION 15083

SECTION 15140 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes domestic water piping inside the building.
- B. Water meters will be furnished and installed by utility company.
- C. Related Sections include the following:
 - 1. Division 2 Section "Water Distribution" for water-service piping outside the building from source to the point where water-service piping enters the building.
 - 2. Division 15 Section "Meters and Gages" for thermometers, pressure gages, and fittings.
 - 3. Division 15 Section "Plumbing Specialties" for water distribution piping specialties.

1.03 DEFINITIONS

- A. PEX: Crosslinked polyethylene plastic.

1.04 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing domestic water piping systems with 125 psig, unless otherwise indicated.
- B. All materials must comply with Indiana plumbing codes.

1.05 SUBMITTALS

- A. Product Data: For pipe, tube, fittings, and couplings.
- B. Water Samples: Specified in Part 3 "Cleaning" Article.
- C. Field quality-control test reports.

1.06 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

- B. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9," for potable domestic water piping and components.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.02 PIPING MATERIALS

- A. See "Writing Guide" Article in the Evaluations for a discussion of this Section's organization and the most efficient way to edit this Section.
- B. Refer to Part 3 "Pipe and Fitting Applications" Article for applications of pipe, tube, fitting, and joining materials.
- C. Transition Couplings for Aboveground Pressure Piping: Coupling or other manufactured fitting the same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.03 COPPER TUBE AND FITTINGS

- A. Soft Copper Tube: ASTM B 88, Types K and L, water tube, annealed temper.
 - 1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - 2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends. Furnish Class 300 flanges if required to match piping.
 - 3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.
- B. Hard Copper Tube: ASTM B 88, Types L and M, water tube, drawn temper.
 - 1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - 2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends. Furnish Class 300 flanges if required to match piping.
 - 3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.
 - 4. Copper, Grooved-End Fittings: ASTM B 75 copper tube or ASTM B 584 bronze castings.

- a. Grooved-End-Tube Couplings: Copper-tube dimensions and design similar to AWWA C606. Include ferrous housing sections, gasket suitable for hot water, and bolts and nuts.
- C. Compression-Type Crimped Connectors: Cooper and copper alloy press fittings shall conform to material requirements of ASME B 16.18 or ASME B 16.22 and performance criteria of IAPMO PS 117. Sealing elements for press fittings shall be EPDM. Sealing elements shall be factory installed. Acceptable for copper hot and cold potable water piping. Temperature from -20°F to 250°F. Mechanically crimped compression fittings with EPDM seal rings manufactured with an inboard bead design. Example Manufacturer: Ridgid Tool Company, the ProPress System, for use on Type 'K' or Type 'L' copper systems.
 1. Manufacturers:
 - a. NIBCO.
 - b. VIEGA.

2.04 PEX PIPE AND FITTINGS

- A. PEX Distribution System: ASTM F 877, SDR 9 tubing.
 1. Fittings for PEX Tube: ASTM F 1807, metal-insert type with copper crimp rings and matching PEX tube dimensions.
 2. Manufacturers:
 - a. Viega with press fit or crimp fittings.
 - b. Uponor with ProPex expansion fittings.

2.05 VALVES

- A. Bronze and cast-iron, general-duty valves are specified in Division 15 Section "General Duty Valves."
- B. Balancing and drain valves are specified in Division 15 Section "Plumbing Specialties."

PART 3 - EXECUTION

3.01 EXCAVATION

- A. Excavating, trenching, and backfilling are specified in Division 2 Section "Earthwork."

3.02 PIPE AND FITTING APPLICATIONS

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
- B. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

- C. Domestic Water Piping on Service Side of Water Meter inside the Building: Use any of the following piping materials for each size range:
 - 1. NPS 4 to NPS 6: Hard copper tube, Type L, Type M; copper pressure fittings; and soldered joints.
 - 2. NPS 4 to NPS 6: Hard copper tube, Type L, Type M with grooved ends; copper grooved-end fittings; grooved-end-tube couplings; and grooved joints.
- D. Under-Building-Slab, Domestic Water Piping, NPS 1 and Smaller: PEX tubing.
- E. Aboveground Domestic Water Piping: Use the following piping materials:
 - 1. NPS 4 and smaller: Hard copper tube, Type L, Type M; copper pressure fittings; and soldered joints.

3.03 VALVE APPLICATIONS

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Shutoff Duty: Use bronze ball valves for piping NPS 2 and smaller. Use cast-iron butterfly valves with flanged ends for piping NPS 2-1/2 and larger.
 - 2. Throttling Duty: Use bronze ball or globe valves for piping NPS 2 and smaller. Use cast-iron butterfly valves with flanged ends for piping NPS 2-1/2 and larger.
 - 3. Hot-Water-Piping, Balancing Duty: Memory-stop balancing valves.
 - 4. Drain Duty: Hose-end drain valves.
- B. Cast-iron, grooved-end valves may be used with grooved-end piping.
- C. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball valves for piping NPS 2 and smaller. Use butterfly or gate valves for piping NPS 2-1/2 and larger.
- D. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping.
 - 1. Install hose-end drain valves at low points in water mains, risers, and branches.
 - 2. Install stop-and-waste drain valves where indicated.
- E. Install calibrated balancing valves in each hot-water circulation return branch and discharge side of each pump and circulator. Set calibrated balancing valves partly open to restrict but not stop flow. Calibrated balancing valves are specified in Division 15 Section "Plumbing Specialties."

3.04 PIPING INSTALLATION

- A. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Division 15 Section "Basic Mechanical Materials and Methods."

1. Core drilled holes through cast concrete foundation walls do not require sleeves.
- B. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Wall penetration systems are specified in Division 15 Section "Basic Mechanical Materials and Methods."
- C. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Pressure gages are specified in Division 15 Section "Meters and Gages," and drain valves and strainers are specified in Division 15 Section "Plumbing Specialties."
- D. Install water-pressure regulators downstream from shutoff valves. Water-pressure regulators are specified in Division 15 Section "Plumbing Specialties."
- E. Install domestic water piping level and plumb.
- F. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

3.05 JOINT CONSTRUCTION

- A. Basic piping joint construction requirements are specified in Division 15 Section "Common Work Results for Plumbing."
- B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.
- C. Extruded-Tee Connections: Form tee in copper tube according to ASTM F 2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.

3.06 HANGER AND SUPPORT INSTALLATION

- A. Pipe hanger and support devices are specified in Division 15 Section "Hangers and Supports." Install the following:
 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 2. Individual, Straight, Horizontal Piping Runs: According to the following:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet: MSS Type 49, spring cushion rolls, if indicated.
 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Install supports according to Division 15 Section "Hangers and Supports."

DOMESTIC WATER PIPING

- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch.
- E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
 - 2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
 - 3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
 - 4. NPS 2-1/2: 108 inches with 1/2-inch rod.
 - 5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
 - 6. NPS 6: 10 feet with 5/8-inch rod.
 - 7. NPS 8: 10 feet with 3/4-inch rod.
- F. Install supports for vertical copper tubing every 10 feet.
- G. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.07 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment and machines to allow service and maintenance.
- C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
- D. Connect domestic water piping to water-service piping with shutoff valve and pressure gauge, and extend and connect to the following:
 - 1. Water Heaters: Cold-water supply and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
 - 2. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 15 Section "Plumbing Fixtures."
 - 3. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.08 FIELD QUALITY CONTROL

- A. Inspect domestic water piping as follows:
 - 1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
 - 2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

DOMESTIC WATER PIPING

- a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
 4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- B. Test domestic water piping as follows:
1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
 2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 4. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
 5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
 6. Prepare reports for tests and required corrective action.

3.09 ADJUSTING

- A. Perform the following adjustments before operation:
1. Close drain valves, hydrants, and hose bibbs.
 2. Open shutoff valves to fully open position.
 3. Open throttling valves to proper setting.
 4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
 - a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide flow of hot water in each branch.
 - b. Adjust calibrated balancing valves to flows indicated.
 5. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.
 6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
 7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
 8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.10 CLEANING

- A. Portions of disinfecting requirements in this Article are taken from model plumbing codes. Edit if requirements vary.
- B. Clean and disinfect potable domestic water piping as follows:
 - 1. Purge new piping before using.
 - 2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
 - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
 - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- C. Prepare and submit reports of purging and disinfecting activities.
- D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION 15140

SECTION 15150 – SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes soil and waste, sanitary drainage and vent piping inside the building and to locations indicated. Trenching and backfilling required in conjunction with interior underground building drain piping is specified in Section 15010 Common Work Results for Plumbing.
- B. Related Sections include the following:
1. Division 15 Section "Common Work Results for Plumbing" for trenching and backfill inside the building underground.
 2. Division 15 Section "Sanitary Waste and Storm Piping Specialties" for soil, waste, and vent piping systems specialties.
 3. Division 07 Section "Joint Sealers" for materials and methods for sealing pipe penetrations through exterior walls.

1.03 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with the following minimum working-pressure ratings, unless otherwise indicated:
1. Soil, Waste, and Vent Piping: 10-foot head of water for a minimum of 60 minutes (1 hour) without loss of water level.

1.04 SUBMITTALS

- A. Product Data: For pipe, tube, fittings, and couplings.
- B. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.05 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.
- B. Flexible Transition Couplings for Underground Nonpressure Piping: ASTM C 1173 with elastomeric sleeve. Include ends of same sizes as piping to be joined and include corrosion-resistant metal band on each end.

2.02 COPPER TUBE AND FITTINGS

- A. Copper DWV Tube: Drain, Waste and Vent: ASTM B 306, drainage tube, drawn temper.

SANITARY WASTE AND VENT PIPING

1. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.

2.03 PVC PIPE AND FITTINGS

- A. PVC Pipe: ASTM D 2665, Socket Type, Schedule 40, PVC DWV pattern.
- B. Drainage Fittings: ASTM D 3311, PVC DWV, Sch 40 solvent weld, glued, drainage pattern.
- C. Cement: VOC 510g/L or less.
- D. Primer: VOC 510 g/L or less.

PART 3 - EXECUTION

3.01 EXCAVATION

- A. Refer to Division 15 Section "Common Work Results for Plumbing" for trenching and backfill inside the building underground.
- B. Refer to Division 02 Section "Earthwork" for excavating, trenching, and backfilling from 5'-0" outside the building.

3.02 PIPING APPLICATIONS

- A. Transition and special fittings with pressure ratings at least equal to piping pressure ratings may be used in applications below, unless otherwise indicated.
- B. Aboveground, Soil, Waste, and Vent Piping all sizes:
 1. PVC pipe with solvent weld joints.
- C. Below ground soil, waste, and vent piping all sizes:
 1. PVC pipe with solvent weld joints.

3.03 PIPING INSTALLATION

- A. Refer to Division 02 Section "Sanitary Sewerage" for Project-site sanitary sewer piping.
- B. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.
- C. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.
- D. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

SANITARY WASTE AND VENT PIPING

- E. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- F. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
 - 1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
 - 2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow for piping NPS3 and smaller.
 - 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- G. Install engineered soil and waste drainage and vent piping systems in locations indicated and as follows:
 - 1. Combination Waste and Vent: Comply with standards of authorities having jurisdiction.
- H. Sleeves are required for piping passing through concrete slabs-on-grade.
- I. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- J. Install PVC soil and waste drainage piping according to ASTM D 2321.
- K. Underground PVC plastic piping shall not be installed in the zone-of-influence of column footings.
 - 1. In cases where PVC plastic piping cannot be avoided from installation in the zone-of-influence, PVC plastic piping shall be encased in cast-iron encasement pipe.

3.04 JOINT CONSTRUCTION

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.
- B. Join PVC piping according to ASTM D 2665.

3.05 HANGER AND SUPPORT INSTALLATION

- A. Refer to Division 15 Section for seismic-restraint devices.
- B. Refer to Division 15 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:
 - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 2. Individual, Straight, Horizontal Piping Runs: According to the following:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
- C. Install supports according to Division 15 Section "Hangers and Supports."
- D. Support vertical piping and tubing at base and at each floor.

SANITARY WASTE AND VENT PIPING

- E. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.
- F. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2 (DN 40 and DN50): 48 inches (1200 mm) with 3/8-inch (10-mm) rod.
 - 2. NPS 3 (DN 80): 48 inches (1200 mm) with 1/2-inch (13-mm) rod.
 - 3. NPS 4 and 5 (DN 100 and 125): 48 inches (1200 mm) with 5/8-inch (16-mm) rod.
 - 4. NPS 6 (DN 150): 48 inches (1200 mm) with 3/4-inch (19-mm) rod.
- G. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/4 : 84 inches with 3/8-inch rod.
 - 2. NPS 1-1/2 and NPS 2 : 96 inches with 3/8-inch rod.
 - 3. NPS 2-1/2 : 108 inches with 1/2-inch rod.
 - 4. NPS 3 : 10 feet with 1/2-inch rod.
 - 5. NPS 4 : 12 feet with 5/8-inch rod.
 - 6. NPS 6: 13 feet with 5/8-inch rod.
- H. Install supports for vertical copper tubing every 10 feet.

3.06 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect drainage and vent piping to the following:
 - 1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 15 Section "Plumbing Fixtures."
 - 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
 - 3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 15 Section "Sanitary Waste Piping Specialties."

3.07 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

SANITARY WASTE AND VENT PIPING

- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 1 hour before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
 - 4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 - 5. Dye test all wastelines installed during renovation of existing buildings to ensure waste will not enter storm water system.
 - 6. Prepare reports for tests and required corrective action.

3.08 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 15150

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SECTION 15155 – SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following sanitary drainage piping specialties:
 - 1. Cleanouts.
 - 2. Floor drains.
 - 3. Backwater valves.
 - 4. Trench drains.
 - 5. Floor drain trap sealers.

1.03 DEFINITIONS

- A. CI: Cast Iron.
- B. PVC: Polyvinyl chloride plastic.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for the following:
 - 1. Cleanouts.
 - 2. Floor drains.
 - 3. Backwater valves.
 - 4. Trench drains.
 - 5. Floor drain trap sealers.
- B. Shop Drawings: Show fabrication and installation details for frost-resistant vent terminals.
- C. Field quality-control test reports.

1.05 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic sanitary piping specialty components.

1.06 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Coordinate size and location of roof penetrations.

SANITARY WASTE PIPING SPECIALTIES

PART 2 - PRODUCTS

2.01 CLEANOUTS

A. Floor Cleanouts: CO

1. Manufacturers: Subject to compliance with requirements, furnish products by the following:
 - a. Josam Leveleze II.
 - b. Zurn BZ Series Level-Trol.
2. Standard: ASME A112.36.2M for cast-iron soil pipe with cast-iron ferrule threaded, adjustable housing cleanout.
3. Size: Same as connected branch.
4. Type: Cast-iron soil pipe with cast-iron ferrule threaded, adjustable housing.
5. Body or Ferrule: Cast iron or combination cast-iron/ABS body and frame.
6. Outlet Connection: Inside calk.
7. Closure: Brass plug with straight threads and gasket.
8. Adjustable Housing Material: Cast iron with threads.
9. Frame and Cover Material and Finish: Nickel-bronze, copper alloy.
10. Frame and Cover Shape: Round.
11. Top: Adjustable after the concrete pour.
12. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting or PVC riser to cleanout.
13. Pattern: Exposed flush type, standard non slip scoriated finish.
14. Pattern: In carpeted areas, polished bronze flush type, standard non slip scoriated finish stainless steel carpet marker.
15. Pattern: In tile, nickel bronze flush type, standard non slip scoriated finish.
16. Pattern: In terrazzo: terrazzo tile cover.

B. Cast-Iron Wall Cleanouts: WCO:

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:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - d. Tyler Pipe; Wade Div.
 - e. Watts Drainage Products Inc.
 - f. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Body: T-branch as required to match connected piping.
5. Closure: Countersunk or raised-head plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
7. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with vandal-proof screw.

2.02 FLOOR DRAINS

- A. Cast-Iron Floor Drains See Schedule on Drawings:

SANITARY WASTE PIPING SPECIALTIES

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - d. Tyler Pipe; Wade Div.
 - e. Watts Drainage Products Inc.
 - f. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.6.3.
3. Pattern: Floor drain. See schedule on drawings.
4. Body Material: Cast iron.
5. Outlet: Bottom.
6. Sediment Bucket: Where shown on drawings.
7. Top or Strainer Material: As scheduled on drawings.
8. Top Shape: Round unless noted otherwise.
9. Trap Seal: "Sure Seal"

2.03 BACKWATER VALVES

- A. PVC construction with EDPM flapper seal:
 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:
 - a. Spears Manufacturing Co.
 2. Standard: ASME/ANSI A112.14.1.
 3. Housing: PVC, ASTM D1784.
 4. Size: Same as connected piping.
 5. Riser Pipe: Sized for convenient removal, inspection or replacement.

2.04 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

- A. Deep-Seal Traps See Schedule on Drawings:
 1. Description: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap-seal primer valve connection.
 2. Size: Same as connected waste piping.
 - a. NPS 2 : 4-inch- minimum water seal.
 - b. NPS 2-1/2) and Larger: 5-inch- minimum water seal.
- B. SureSeal Vent-Guard for vents-through-roof.

2.05 TRENCH DRAINS

- A. Fiberglass Channel Drainage Systems:
 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:
 - a. Josam Company; Mea-Josam Div.
 - b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - c. Zurn Plumbing Products Group; Flo-Thru Operation.

SANITARY WASTE PIPING SPECIALTIES

2. Description: Modular system of channel sections, grates, and appurtenances; designed so grates fit into channel recesses without rocking or rattling.
 - a. Channel Sections: Interlocking-joint, sloped-invert, FRP modular units, with end caps. Include flat, rounded, or inclined inside bottom, with outlets in number, sizes, and locations indicated.
 - 1). Dimensions: 6 inches (152 mm) wide. Include number of units required to form total lengths indicated.
 - 2). Frame: Dura-coated steel for grates.
 - b. Grates: With slots or perforations and widths and thickness that fit recesses in channel sections.
 - 1). Material: Ductile-iron.
 - 2). Locking Mechanism: Manufacturer's standard lock down hardware for securing grates to channel sections.
 - c. Supports, Anchors, and Setting Devices: Manufacturer's standard, unless otherwise indicated.
 - d. Channel-Section Joining and Fastening Materials: As recommended by system manufacturer.
- B. Catch Basins:
 1. Description: 24 inch- (610 mm-) square body with outlets in number and sizes indicated. Include gray-iron frame and heavy-duty cast iron slotted grate.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Refer to Division 15 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.
- B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
 1. Size same as drainage piping up to NPS 4 .Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
 2. Locate at each change in direction of piping greater than 45 degrees.
 3. Locate at minimum intervals of 100 feet.
 4. Locate at base of each vertical soil and waste stack.
- C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
 1. Position floor drains for easy access and maintenance.

SANITARY WASTE PIPING SPECIALTIES

2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
 - a. Radius, 30 Inches (750 mm) or Less: Equivalent to 1 percent slope, but not less than 1/4-inch (6.35-mm) total depression.
 - b. Radius, 30 to 60 Inches (750 to 1500 mm): Equivalent to 1 percent slope.
 - c. Radius, 60 Inches (1500 mm) or Larger: Equivalent to 1 percent slope, but not greater than 1-inch (25-mm) total depression.
 - d. Do not slope floors for kitchen floor drains or floor sinks.
 3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
 4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
 5. Install floor drain trap sealers in outlet of floor drains.
- F. Install backwater valve with riser pipe, concrete collar and cast-iron access lid.
- G. Install deep-seal traps on floor drains and other waste outlets, where shown on drawings.
- H. Install vent caps on each vent pipe passing through roof.
- I. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.
- J. Install trench drains at low points of floor areas per the drawings.
 1. Coordinate location with radiant heating below floor.
- K. Install SureSeal Vent-Guard on vents terminating above roof if located within 20 foot radius of fresh air intake.

3.02 CONNECTIONS

- A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment to allow service and maintenance.

3.03 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.04 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 15155

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SECTION 15194 - FUEL GAS PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes fuel gas piping within the building. Products include the following:
 - 1. Pipe, tube, fittings, and joining materials.
 - 2. Protective pipe and fitting coating.
 - 3. Piping specialties.
 - 4. Specialty valves.
 - 5. Pressure regulators.

1.03 PROJECT CONDITIONS

- A. Gas System Pressures: Primary pressure is less than 1.0 psig.

1.04 SUBMITTALS

- A. Product Data: For the following:
 - 1. Specialty valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
 - 2. Pressure regulators. Include pressure rating, capacity, and settings of selected models.
- B. Shop Drawings: For fuel gas piping. Include plans and attachments to other work.
 - 1. Wiring Diagrams: Power, signal, and control wiring.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For natural gas specialties and accessories to include in emergency, operation, and maintenance manuals.

1.05 QUALITY ASSURANCE

- A. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.

- B. Electrical Components and Devices: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. NFPA Standard: Comply with NFPA 54, "National Fuel Gas Code."

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.02 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.03 CORRUGATED, STAINLESS-STEEL TUBING SYSTEMS

- A. Description: Comply with AGA LC 1 and include the following:
 - 1. Tubing: Corrugated stainless steel with plastic jacket or coating.
 - 2. Fittings: Copper alloy with ends made to fit corrugated tubing. Include ends with threads according to ASME B1.20.1 if connection to threaded pipe or fittings is required.
 - 3. Striker Plates: Steel, designed to protect tubing from penetrations.
 - 4. Manifolds: Malleable iron or steel with protective coating. Include threaded connections according to ASME B1.20.1 for pipe inlet and corrugated tubing outlets.
 - 5. Manufacturers:
 - a. OmegaFlex, Inc.
 - b. Titeflex Corp.
 - c. Tru-Flex Metal Hose Corp.
 - d. Ward Industries, Inc.

2.04 PIPES, TUBES, FITTINGS, AND JOINING MATERIALS

- A. Steel Pipe: ASTM A 53/A 53M; Type E or S; Grade B; black. Wall thickness of wrought-steel pipe shall comply with ASME B36.10M.
 - 1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern, with threaded ends according to ASME B1.20.1.

2. Steel Threaded Fittings: ASME B16.11, forged steel with threaded ends according to ASME B1.20.1.
3. Steel Welding Fittings: ASME B16.9, wrought steel or ASME B16.11, forged steel.
4. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends according to ASME B1.20.1.
5. Cast-Iron Flanges and Flanged Fittings: ASME B16.1, Class 125.
6. Joint Compound and Tape: Suitable for natural gas.
7. Steel Flanges and Flanged Fittings: ASME B16.5.
8. Gasket Material: Thickness, material, and type suitable for natural gas.

2.05 PROTECTIVE COATING

- A. Furnish pipe and fittings with factory-applied, corrosion-resistant polyethylene coating for use in contact with materials that may corrode the pipe.

2.06 PIPING SPECIALTIES

- A. Flexible Connectors: ANSI Z21.24, copper alloy.
- B. Quick-Disconnect Devices: ANSI Z21.41, convenience outlets and matching plug connector.

2.07 SPECIALTY VALVES

- A. Valves, NPS 2 and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.
- B. Valves, NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.
- C. Appliance Connector Valves: ANSI Z21.15 and CSA International listed.
 1. Manufacturers:
 - a. American Valve Inc.
 - b. B&K Industries, Inc.
 - c. Brass Craft Manufacturing Co.
 - d. Conbraco Industries, Inc.; Apollo Div.
 - e. Key Gas Components, Inc.
 - f. Legend Valve and Fitting, Inc.
 - g. McDonald, A. Y. Mfg. Co.
 - h. Mueller Co.; Mueller Gas Products Div.
 - i. Newman Hattersley Ltd.; Specialty Valves Div.
 - j. Watts Industries, Inc.; Water Products Div.
- D. Gas Stops: Bronze body with AGA stamp, plug type with bronze plug and flat or square head, ball type with chrome-plated brass ball and lever handle, or butterfly valve with stainless-steel disc and fluorocarbon elastomer seal and lever handle; 2-psig minimum pressure rating.

- E. Gas Valves, NPS 2 and Smaller: ASME B16.33 and CSA International-listed bronze body and 125-psig pressure rating.
 - 1. Manufacturers:
 - a. Crane Valves.
 - b. Grinnell Corp.
 - c. Legend Valve and Fitting, Inc.
 - d. McDonald, A. Y. Mfg. Co.
 - e. Milwaukee Valve Company.
 - f. Mueller Co.; Mueller Gas Products Div.
 - g. NIBCO INC.
 - h. Red-White Valve Corp.
 - 2. Tamperproof Feature: Include design for locking.
- F. Plug Valves, NPS 2-1/2 and Larger: ASME B16.38 and MSS SP-78 cast-iron, lubricated plug valves, with 125-psig pressure rating.
 - 1. Manufacturers:
 - a. Flow Control Equipment, Inc.
 - b. Milliken Valve Co., Inc.
 - c. Nordstrom Valves, Inc.
 - d. Olson Technologies, Inc.; Homestead Valve Div.
 - e. Walworth Co.
 - 2. Tamperproof Feature: Include design for locking.

2.08 PRESSURE REGULATORS

- A. Description: Single stage and suitable for fuel gas service. Include steel jacket and corrosion-resistant components, elevation compensator, and atmospheric vent.
 - 1. Manufacturers:
 - a. Service Pressure Regulators:
 - 1) American Meter Company.
 - 2) Fisher Controls International, Inc.; Division of Emerson.
 - 3) Invensys.
 - 4) National Meter Industries, Inc.
 - 5) Richards Industries, Inc.; Jordan Valve Div.
 - 6) Schlumberger Limited; Gas Div.
 - b. Appliance Pressure Regulators:
 - 1) Canadian Meter Co., Inc.
 - 2) Eaton Corporation; Controls Div.
 - 3) Harper Wyman Co.
 - 4) Maxitrol Company.

5) SCP, Inc.

2. NPS 2 and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.
 3. NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.
 4. Line Pressure Regulators: ANSI Z21.80 with 2-psig-minimum inlet pressure rating.
 5. Appliance Pressure Regulators: ANSI Z21.18. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
- B. Pressure Regulator Vents: Factory- or field-installed, corrosion-resistant screen in opening if not connected to vent piping.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine roughing-in for gas piping system to verify actual locations of piping connections before equipment installation.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 SERVICE ENTRANCE PIPING

- A. Extend fuel gas piping from meter and connect to fuel gas at service entrance to building.
1. Exterior fuel gas distribution system piping, service pressure regulator, and service meter will be provided by gas utility.
- B. Install dielectric fitting downstream from and adjacent to each service meter unless meter is supported from service-meter bar with integral dielectric fitting. Install shutoff valve downstream from and adjacent to dielectric fitting. Dielectric fittings are specified in Division 15 Section "Basic Mechanical Materials and Methods."

3.05 PIPING APPLICATIONS

- A. Flanges, unions, transition, and special fittings with pressure ratings same as or higher than system pressure rating may be used in applications below, unless otherwise indicated.
- B. Fuel Gas Piping, 2 psig or Less:
1. NPS 2 and Smaller steel pipe, malleable-iron threaded fittings, and threaded joints
 2. NPS 2-1/2 and Larger: Steel pipe, steel welding fittings, and welded joints.
- C. Underground Fuel Gas Piping: Steel pipe, steel welding fittings, and welded joints. Encase in containment conduit.
- D. Containment Conduits: Steel pipe, steel welding fittings, and welded joints.

FUEL GAS PIPING

3.06 VALVE APPLICATIONS

- A. Appliance Shutoff Valves for Pressure 0.5 psig or Less: Appliance connector valve or gas stop.
- B. Appliance Shutoff Valves for Pressure 0.5 to 2 psig: Gas stop or gas valve.
- C. Piping Line Valves, NPS 2 and Smaller: Gas valve.
- D. Piping Line Valves, NPS 2-1/2 and Larger: Plug valve or general-duty valve.

3.07 PIPING INSTALLATION

- A. Basic piping installation requirements are specified in Division 15 Section "Basic Mechanical Materials and Methods."
- B. Concealed Locations: Except as specified below, install concealed gas piping in airtight conduit constructed of Schedule 40, seamless, black steel pipe with welded joints. Vent conduit to outside and terminate with screened vent cap.
 - 1. Above-Ceiling Locations: Gas piping may be installed in accessible spaces, subject to approval of authorities having jurisdiction, whether or not such spaces are used as plenums. Do not locate valves above ceilings.
 - 2. In Floors: Gas piping with welded joints and protective wrapping specified in Part 2 "Protective Coating" Article may be installed in floors, subject to approval of authorities having jurisdiction. Surround piping cast in concrete slabs with minimum of 1-1/2 inches of concrete. Piping may not be in physical contact with other metallic structures such as reinforcing rods or electrically neutral conductors. Do not embed piping in concrete slabs containing quick-set additives or cinder aggregate.
 - 3. In Floor Channels: Gas piping may be installed in floor channels, subject to approval of authorities having jurisdiction. Channels must have cover and be open to space above cover for ventilation.
 - 4. In Partitions: Do not install concealed piping in solid partitions. Protect tubing from physical damage when installed inside partitions or hollow walls.
 - a. Exception: Tubing passing through partitions or walls.
 - 5. In Walls: Gas piping with welded joints and protective wrapping specified in Part 2 "Protective Coating" Article may be installed in masonry walls, subject to approval of authorities having jurisdiction.
 - 6. Prohibited Locations: Do not install gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
 - a. Exception: Accessible above-ceiling space specified above.
- C. Drips and Sediment Traps: Install drips at points where condensate may collect. Include outlets of service meters. Locate where readily accessible for cleaning and emptying. Do not install where condensate would be subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use minimum-length nipple of 3 pipe diameters, but not less than 3 inches long, and same size as connected pipe. Install with space between bottom of drip and floor for removal of plug or cap.
- D. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels, unless indicated to be exposed to view.
- E. Install fuel gas piping at uniform grade of 0.1 percent slope upward toward risers.
- F. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- G. Connect branch piping from top or side of horizontal piping.
- H. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.
- I. Install corrugated, stainless-steel tubing system according to manufacturer's written instructions. Include striker plates to protect tubing from puncture where tubing is restrained and cannot move.
- J. Install strainer on inlet of each line pressure regulator and automatic and electrically operated valve.
- K. Install pressure gage downstream from each line pressure regulator. Pressure gages are specified in Division 15 Section "Meters and Gages."
- L. Install flanges on valves, specialties, and equipment having NPS 2-1/2 and larger connections.
- M. Install vent piping for gas pressure regulators and gas trains, extend outside building, and vent to atmosphere. Terminate vents with turned-down, reducing-elbow fittings with corrosion-resistant insect screens in large end.
- N. Install containment conduits for gas piping below slabs, within building, in gastight conduits extending minimum of 4 inches outside building, and vented to atmosphere. Terminate vents with turned-down, reducing-elbow fittings with corrosion-resistant insect screens in large end. Prepare and paint outside of conduits with coal-tar, epoxy-polyamide paint according to SSPC-Paint 16.

3.08 JOINT CONSTRUCTION

- A. Basic piping joint construction is specified in Division 15 Section "Basic Mechanical Materials and Methods."
- B. Use materials suitable for fuel gas.
 1. Brazed Joints: Make with brazing alloy with melting point greater than 1000 deg F. Brazing alloys containing phosphorus are prohibited.

FUEL GAS PIPING

- C. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

3.09 HANGER AND SUPPORT INSTALLATION

- A. Pipe hanger and support and equipment support materials and installation requirements are specified in Division 15 Section "Hangers and Supports."

3.10 CONNECTIONS

- A. Coordinate piping installations and specialty arrangements with schematics on Drawings and with requirements specified in piping systems. If Drawings are explicit enough, these requirements may be reduced or omitted.
- B. Drawings indicate general arrangement of fuel gas piping, fittings, and specialties.
- C. Install piping adjacent to appliances to allow service and maintenance.
- D. Connect piping to appliances using gas with shutoff valves and unions. Install valve upstream from and within 72 inches of each appliance. Install union downstream from valve.
- E. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance using gas.
- F. Ground equipment according to Division 16 Section "Grounding and Bonding."
 - 1. Do not use gas pipe as grounding electrode.
- G. Connect wiring according to Division 16 Section "Conductors and Cables."

3.11 LABELING AND IDENTIFYING

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each pressure regulator, and specialty valve.
 - 1. Text: In addition to name of identified unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
 - 2. Nameplates, pipe identification, and signs are specified in Division 15 Section "Common Work Results for Mechanical."

3.12 PAINTING

- B. Use materials and procedures in Division 9 painting Sections.
- C. Paint exterior Contractor installed piping, pressure regulators, and specialty valves.

1. Color: safety yellow.

3.13 FIELD QUALITY CONTROL

- A. Test, inspect, and purge piping according to NFPA 54 and requirements of authorities having jurisdiction.
- B. Repair leaks and defects with new materials and retest system until satisfactory results are obtained.
- C. Verify capacities and pressure ratings of service meters, pressure regulators, valves, and specialties.
- D. Verify correct pressure settings for pressure regulators.
- E. Verify that specified piping tests are complete.

END OF SECTION 15194

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SECTION 15211 - GENERAL-SERVICE COMPRESSED-AIR PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. See Equipment Schedule on the plans for air compressor.

1.02 SUMMARY

- A. This Section includes piping and related specialties for general-service compressed-air systems operating at 200 psig or less.

1.03 DEFINITIONS

- A. Low-Pressure Compressed-Air Piping: System of compressed-air piping and specialties operating at pressures of 100 psig or less.

1.04 SUBMITTALS

- A. Product Data: For the following:
 - 1. Dielectric fittings.
 - 2. Flexible pipe connectors.
 - 3. Safety valves.
 - 4. Automatic drain valves.
- B. Field quality-control test reports.
- C. Operation and Maintenance Data: For general-service compressed-air piping specialties to include in emergency, operation, and maintenance manuals.

1.05 QUALITY ASSURANCE

- A. ASME Compliance:
 - 1. Comply with ASME B31.9, "Building Services Piping," for low-pressure compressed-air piping.

PART 2 - PRODUCTS

2.01 PIPES, TUBES, AND FITTINGS

- A. Schedule 40, Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B, black or hot-dip zinc coated with ends threaded according to ASME B1.20.1.
1. Steel Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, galvanized seamless steel pipe. Include ends matching joining method.
 2. Malleable-Iron Fittings: ASME B16.3, Class 150 or 300, threaded.
 3. Malleable-Iron Unions: ASME B16.39, Class 150 or 300, threaded.
 4. Steel Flanges: ASME B16.5, Class 150 or 300, carbon steel, threaded.
 5. Wrought-Steel Butt-Welding Fittings: ASME B16.9, Schedule 40.
 6. Steel Flanges: ASME B16.5, Class 150 or 300, carbon steel.
 7. Grooved-End Fittings and Couplings:
 - 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:
 - 1) Anvil International, Inc.
 - 2) Star Pipe Products; Star Fittings Div.
 - 3) Victaulic Company.
 - 4) Ward Manufacturing, Inc.
 - b. Grooved-End Fittings: ASTM A 47/A 47M, malleable-iron castings or ASTM A 536, ductile-iron casting; with grooves according to AWWA C606 and dimensions matching steel pipe.
 - c. Couplings: AWWA C606 or UL 213, for steel-pipe dimensions and rated for 300-psig minimum working pressure. Include ferrous housing sections, gasket suitable for compressed air, and bolts and nuts. Provide EDPM gaskets for oil-free compressed air. Provide NBR gaskets if compressed air contains oil or oil vapor.
- B. Copper Tube: ASTM B 88, Type K or L and ASTM B 88, Type M seamless, drawn-temper, water tube.
1. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type or MSS SP-73, wrought copper with dimensions for brazed joints.
 2. Cast-Copper-Alloy Flanges: ASME B16.24, Class 150 or 300.
 3. Copper Unions: ASME B16.22 or MSS SP-123.
 4. Extruded-Tee Outlets: Procedure for making branch outlets in copper tube according to ASTM F 2014.
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering procedure that may be incorporated into the Work include, but are not limited to, the following:
 - 1) T-DRILL Industries Inc.

2.02 JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: Suitable for compressed-air piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
- B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- D. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated.
- E. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.03 VALVES

- A. Metal Ball, Butterfly, Check, Gate, and Globe Valves: Comply with requirements in Division 15 Section "General Duty Valves."

2.04 DIELECTRIC FITTINGS

- A. General Requirements for Dielectric Fittings: see General Mechanical Requirements.

2.05 FLEXIBLE PIPE CONNECTORS

- 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:
 - 1. Flex-Hose Co., Inc.
 - 2. Flexicraft Industries.
 - 3. Hyspan Precision Products, Inc.
 - 4. Mercer Rubber Co.
 - 5. Metraflex, Inc.
 - 6. Proco Products, Inc.
 - 7. Unaflex, Inc.
 - 8. Universal Metal Hose; a Hyspan Company
- B. Bronze-Hose Flexible Pipe Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
 - 1. Working-Pressure Rating: 200 psig minimum.
 - 2. End Connections, NPS 2 and Smaller: Threaded copper pipe or plain-end copper tube.

3. End Connections, NPS 2-1/2 and Larger: Flanged copper alloy.
- C. Stainless-Steel-Hose Flexible Pipe Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.
1. Working-Pressure Rating: 200 psig minimum.
 2. End Connections, NPS 2 and Smaller: Threaded steel pipe nipple.
 3. End Connections, NPS 2-1/2 and Larger: Flanged steel nipple.

2.06 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 1. Underdeck Clamp: Clamping ring with set screws.

2.07 ESCUTCHEONS

- A. General Requirements: Manufactured wall and ceiling escutcheons and floor plates, with ID to closely fit around pipe and tube and OD that completely covers opening.
- B. One-Piece, Deep-Pattern Escutcheons: Deep-drawn, box-shaped brass with polished chrome-plated finish.

2.08 SPECIALTIES

- A. Safety Valves: included with air compressor

PART 3 - EXECUTION

3.01 PIPING APPLICATIONS

- A. Low-Pressure Compressed-Air Distribution Piping: Use one of the following piping materials for each size range:
 1. NPS 2 and Smaller: Schedule 40, steel pipe; threaded, malleable-iron fittings; and threaded joints.
 2. NPS 2 and Smaller: Type K or L, copper tube; wrought-copper fittings; and brazed or soldered joints.

3.02 VALVE APPLICATIONS

- A. General-Duty Valves: Comply with requirements in Division 15 Section "General Duty Valves" for metal general-duty valves. Use metal valves, unless otherwise indicated.
 - 1. Metal General-Duty Valves: Use valve types specified in "Valve Applications" Article in Division 15 Section "Valves" according to the following:
 - a. Low-Pressure Compressed Air: Valve types specified for low-pressure compressed air.

3.03 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of compressed-air piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, air-compressor sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

3.11 ESCUTCHEON INSTALLATION

- A. Install escutcheons for penetrations of walls, ceilings, and floors

3.13 LABELING AND IDENTIFICATION

- A. Install identifying labels and devices for general-service compressed-air piping, valves, and specialties. Comply with requirements in Division 15 Section "Common Work Results for Mechanical."

3.14 FIELD QUALITY CONTROL

- A. Perform field tests and inspections.
- B. Tests and Inspections:
 - 1. Piping Leak Tests for Metal Compressed-Air Piping: Test new piping. Cap and fill general-service compressed-air piping with oil-free dry air or gaseous nitrogen to pressure of 100 psig Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.
 - 2. Repair leaks and retest until no leaks exist.
- C. Prepare test reports.

END OF SECTION 15211

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SECTION 15410 – PLUMBING FIXTURES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes plumbing fixtures and related components.
 - 1. Faucets for lavatories and sinks.
 - 2. Flushometers.
 - 3. Toilet seats.
 - 4. Protective shielding guards.
 - 5. Fixture supports.
 - 6. Water closets.
 - 7. Lavatories.
 - 8. Sinks.
 - 9. Urinals.
 - 10. Mop basins.
 - 11. Showers.
- B. Related Sections include the following:
 - 1. Division 15 Section "Piping Specialties" for specialty fixtures not in this Section.

1.03 DEFINITIONS

- A. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.
- B. Fitting: Device that controls flow of water into or out of plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.

1.04 SUBMITTALS

- A. Product Data: Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports and indicate materials and finishes, dimensions, construction details, and flow-control rates for each type of fixture indicated.
- B. Shop Drawings: Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.
- C. Maintenance Data: For plumbing fixtures to include in maintenance manuals specified in Division 1.

1.05 QUALITY ASSURANCE

- A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.
 - 1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.

PLUMBING FIXTURES

- B. 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.
- C. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities" and "Americans with Disabilities Act"; about plumbing fixtures for people with disabilities.
- D. Regulatory Requirements: Comply with requirements in U.S. Architectural & Transportation Barriers Compliance Board's "Uniform Federal Accessibility Standards (UFAS), 1985-494-187" about plumbing fixtures for people with disabilities.
- E. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
- F. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
- G. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.
- H. Comply with the following applicable standards and other requirements specified for plumbing fixtures:
 - 1. Hand Sinks: NSF 2 construction.
 - 2. Enameled, Cast-iron Fixtures: ASME A112.19.1M
 - 3. Porcelain-Enameled, Formed-Steel Fixtures: ASME A112.19.4M.
 - 4. Stainless-Steel Fixtures Other Than Service Sinks: ASME A112.19.3M.
 - 5. Vitreous-China Fixtures: ASME A112.19.2M.
 - 6. Water-Closet Flush Valve, Trim: ASME A112.19.2M.
- I. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:
 - 1. Backflow Protection Devices for Faucets with Side Spray: ASME A112.18.3M.
 - 2. Backflow Protection Devices for Faucets with Hose-Thread Outlet: ASME A112.18.3M.
 - 3. Faucet Hose: ASTM D 3901.
 - 4. Faucets: ASME A112.18.1M.
 - 5. Hose-Connection Vacuum Breakers: ASSE 1011.
 - 6. Hose-Coupling Threads: ASME B1.20.7.
 - 7. Integral, Atmospheric Vacuum Breakers: ASSE 1001.
 - 8. NSF Materials: NSF 61.
 - 9. Pipe Threads: ASME B1.20.1.
 - 10. Supply and Drain Fittings: ASME A112.18.1M.
- J. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:
 - 1. Atmospheric Vacuum Breakers: ASSE 1001.
 - 2. Brass and Copper Supplies: ASME A112.18.1M.
 - 3. Plastic Tubular Fittings and Piping: ASTM F 409.
 - 4. Tubular Brass Drainage Fittings and Piping: ASME A112.18.1M.

PLUMBING FIXTURES

- K. Comply with the following applicable standards and other requirements specified for miscellaneous components:
 - 1. Grab Bars: ASTM F 446.
 - 2. Hose-Coupling Threads: ASME B1.20.7.
 - 3. Off-Floor Fixture Supports: ASME A112.6.1M.
 - 4. Pipe Threads: ASME B1.20.1.
 - 5. Plastic Toilet Seats: ANSI Z124.5.
 - 6. Supply and Drain Protective Shielding Guards: ICC A117.1; ASTM C1822.

1.06 COORDINATION

- A. Coordinate roughing-in and final plumbing fixture locations, and verify that fixtures can be installed to comply with original design and referenced standards.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. For fixture descriptions in other Part 2 articles where the subparagraph titles “Products” and “Manufacturers” introduce a list of manufacturers and their products or manufacturers only, the following requirements apply for product selection:
 - 1. Products: Subject to compliance with requirements, provide one of the products specified in other Part 2 articles.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified in other Part 2 articles, and schedule on the drawings.

2.02 LAVATORY FAUCETS

- A. Lavatory Faucet, battery-operated design; 0.5 gpm aerator: Include thermostatic mixing valve; coordinate faucet inlets with supplies and fixture holes and outlet with spout and fixture receptor.
 - 1. Manufacturers:
 - 1. Faucets:
 - 1) Zurn Industries Commercial Brass
 - 2. Stops and Supplies, quarter-turn ball valve stops and chrome risers:
 - 1) Brasscraft
 - 2) McGuire
 - 3) Zurn Industries Commercial Brass
 - 3. P-Traps:
 - 1) Dearborn
 - 2) McGuire
 - 3) Zurn Industries Commercial Brass

2.03 WATERLESS URINALS

- A. Basis-of-Design Product: No substitutes allowed.
 - 1. Sloan Waterfree Urinal.

2.04 FLUSHOMETERS

- A. Flushometers, Water Closets:

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings:
 - a. Sloan Valve Company

2. Description: Flushometer for water-closet type fixture. Include brass body with corrosion-resistant internal components, control stop with check valve and vandal-resistant stop cap, vacuum breaker, copper or brass tubing, and polished chrome-plated finish on exposed parts.
 - a. Internal Design: Diaphragm with dual filtered fixed bypass.
 - b. Style: Exposed.
 - c. Inlet Size: NPS 1
 - d. Trip Mechanism: Battery operated.
 - e. Consumption: 1.6 gal. /flush .
 - f. Tailpiece Size: NPS 1 ½ and standard length to top of bowl.

2.05 TOILET SEATS

- A. Toilet Seat: Solid plastic.
 1. Manufacturers:
 - a. Bemis Mfg. Co.
 - b. Beneke Corp.
 - c. Church Products.
 - d. Olsonite Corp.
 - e. Plumbtech.
 - f. Zurn.

 2. Configuration: Elongated rim, open front without cover. See schedule on Drawings.
 1. Size: Elongated.
 2. Class: Standard commercial.
 3. Hinge Type: CK, check with stainless steel posts.
 4. Color: White.

2.06 PROTECTIVE SHIELDING GUARDS

- A. Protective Shielding Guard, for ADA lavatories: Manufactured, plastic covering for hot- and cold-water supplies and trap and drain piping and complying with ADA requirements.
 1. Manufacturers:
 1. Plumberex.

2.07 FIXTURE SUPPORTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Josam Company.
 2. Smith, Jay R. Mfg. Co.
 3. Watts.
 4. Zurn.

- B. Water-Closet Supports:
 1. Description: Combination carrier designed for accessible and standard mounting height of wall-mounting, water-closet-type fixture. Include single or double, vertical or horizontal, hub-and-spigot or hubless waste fitting as required for

pipng arrangement; faceplates; couplings with gaskets; feet; and fixture bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.

- C. Wall-Hung Lavatory Supports:
 - 1. Description: Type II, lavatory carrier with concealed arms and tie rod for wall-mounting, lavatory-type fixture. Include steel uprights with feet.
 - 2. Accessible-Fixture Support: Include rectangular steel uprights.

2.08 WATER CLOSETS AND LAVATORIES

- A. Manufacturers – subject to compliance with requirements, provide products by one the of the following:
 - 1. American Standard.
 - 2. Kohler.
 - 3. Zurn.
 - 4. Soan.

2.09 FLUSHOMETERS

- A. Provide flushometers compatible with fixtures, with features and of consumption indicated.
- B. Construction: Cast-brass body, brass or copper pipe or tubing inlet with cover tube and cast set screw all flange and tailpiece with spud, screwdriver check stop with vandal resistant stop cap with set screw, vacuum breakers, and equipped with battery operated actuator. Diaphragm shall be synthetic rubber with dual filtered fixed bypass.

2.10 FITTINGS, TRIM AND ACCESSORIES

- A. Toilet Seats: Elongated, extra heavy duty solid white plastic, closed back/open front, less cover, and having stainless steel check hinge and integral bumpers, as listed by the fixture Manufacturer as a recommended seat.
- B. Supplies and Stops for Lavatories and Sinks: Polished chrome-plated, commercial pattern quarter-turn brass ball valve stop having 1/2" inlet and 3/8" O.D. x 12" long flexible tubing outlet and escutcheon such as manufactured by McGuire Mfg. Co., Inc.
- C. Sink Traps: 17 gauge cast brass, 1-1/2" adjustable "P" trap with cleanout and waste to wall.
- D. Lavatory Traps: 17 gauge cast brass, 1-1/4" adjustable "P" trap with cleanout and waste to wall.
- E. Escutcheons for Traps: Polished chrome-plated sheet steel deep or box flange.
- F. Escutcheons for lavatory supplies shall be stainless steel.

2.11 STAINLESS STEEL HAND SINKS

- A. Subject to compliance with requirements, provide products by one of the following:

PLUMBING FIXTURES

1. Elkay Mfg. Co.
2. Just Mfg. Co.

2.12 SHOWERS

A. Subject to compliance with requirements, provide the following product:

1. Comfort Designs.

2.13 MOP BASINS

A. Subject to compliance with requirements, provide products by one of the following:

1. E.L. Mustee & Sons, Inc.
2. Fiat Products.
3. Stern Williams.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine roughing-in for water soil and for waste piping systems and supports to verify actual locations and sizes of piping connections and that locations and types of supports match those indicated, before plumbing fixture installation. Use manufacturer's roughing-in data if roughing-in data are not indicated.
- B. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 FIXTURE INSTALLATION

- A. Assemble fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- B. For wall-hanging fixtures, install off-floor supports affixed to building substrate.
 1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
 2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
 3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
- C. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
- D. Install back-outlet, wall-hanging fixtures onto waste fitting seals and attach to supports.
- E. Install wall-hanging fixtures with tubular waste piping attached to supports.

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- F. Install counter-mounting fixtures in and attached to casework.
- G. Install fixtures level and plumb according to manufacturers' written instructions and roughing-in drawings.
- H. Install water-supply piping with loose key stop on each supply to each fixture to be connected to water distribution piping.

Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
 - 1. Exception: Use ball or globe valve if stops are not specified with fixture. Refer to Division 15 Section for general-duty valves.
- I. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
- J. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.
- K. Provide cartridge with trap-seal liquid in dry urinals.
- L. Install toilet seats on water closets.
- M. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- N. Install water-supply, flow-control fittings with specified flow rates in fixture supplies at stop valves.
- O. Install faucet, flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- P. Install traps on fixture outlets.
 - 1. Exception: Omit trap on fixtures with integral traps.
- Q. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for escutcheons.
- R. Set service basins in leveling bed of cement grout. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for grout.
- S. Seal joints between and all around fixtures and walls, floors, and counters using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Refer to Division 07 Section "Joint Sealants" for sealant and installation requirements.

3.03

CONNECTIONS

- A. Piping installation requirements are specified in Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

PLUMBING FIXTURES

- B. Connect water supplies from water distribution piping to fixtures.
- C. Connect drain piping from fixtures to drainage piping.
- D. Supply and Waste Connections to Plumbing Fixtures: Connect fixtures with water supplies, stops, risers, traps, and waste piping. Use size fittings required to match fixtures. Connect to plumbing piping.
- E. Supply and Waste Connections to Fixtures and Equipment Specified in Other Sections:

Connect fixtures and equipment with water supplies, stops, risers, traps, and waste piping specified. Use size fittings required to match fixtures and equipment. Connect to plumbing piping.
- F. Ground equipment.
 - 1. 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.
- G. Make final connections to factory-installed shower mixing valve and hand-held shower.
- H. Connect waste piping to shower trench drain and install trap.

3.04

FIELD QUALITY CONTROL

- A. Verify that installed fixtures are categories and types specified for locations where installed.
- B. Check that fixtures are complete with trim, faucets, fittings, and other specified components.
- C. Inspect installed fixtures for damage. Replace damaged fixtures and components.
- D. Test newly installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

3.05

ADJUSTING

- A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
- B. Adjust water pressure at faucets, showers and flushometer valves to produce proper flow and stream.
- C. Replace washers and seals of leaking and dripping faucets and stops.

3.06

CLEANING

- A. Clean fixtures, faucets, and other fittings and all exposed metal surfaces from grease, dirt, or any foreign matter. Polish chrome plated piping, fittings, and trim with manufacturers' recommended cleaning methods and materials.
 - 1. Remove sediment, debris and "plumber's putty" from drains.

3.07 PROTECTION

- A. Provide protective covering for installed fixtures and fittings. Protect fixtures from damage until acceptance by the Owner.

- B. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 15410

SECTION 15430 – PIPING SPECIALTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following plumbing specialties:
 - 1. Water hammer arresters
 - 2. Balancing valves.
 - 3. Wall hydrants.
 - 4. Backflow preventers.
 - 5. Thermostatic Water Mixing Valves.
- B. Related Sections include the following:
 - 1. Division 15 Section “Basic Mechanical Materials and Methods” for thermometers, pressure gages, and flow meters in domestic water piping.
 - 2. Division 15 Section “Drinking Fountains and Water Coolers” for water filters for water coolers.
 - 3. Division 15 Section “Plumbing Fixtures.”

1.03 PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig, unless otherwise indicated.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.
- C. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.
 - 1. Backflow Preventers
 - 2. Balancing Valves
 - 3. Hose Bibbs
 - 4. Wall Hydrants
 - 5. Thermostatic Water Mixing Valves.

1.05 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. NSF Compliance:
 - 1. Comply with NSF 61, “Drinking Water System Components – Health Effects; Sections 1 through 9”.

PART 2 - PRODUCTS

2.01 WATER HAMMER ARRESTERS

- A. Water Hammer Arresters WHA:
1. Available Manufactures: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Josam Company.
 - b. MIFAB, Inc.
 - c. PPP Inc.
 - d. Sioux Chief Manufacturing Company, Inc.
 - e. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - f. Watts Drainage Products, Inc.
 - g. Zurn Plumbing Products Group; Specification Drainage Operation.
 2. Standard: ASSE 1010 or PDI-WH201.
 3. Type: 304 stainless steel casing and bellows.
 4. Size: ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.

2.02 BACKFLOW PREVENTERS

- A. Backflow Preventers BFP:
1. Available Manufactures: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Wilkens/Zurn.
 - b. Watts.
 - c. Febco.
 - d. Ames Fire and Waterworks.
- B. General: ASSE Standard, backflow preventers.
1. NPS 2 (DN 50) and Smaller: Bronze body with threaded ends.
 2. NPS 2-1/2 (DN 65) and Larger: Bronze, cast-iron, steel, or stainless-steel body with flanged ends.
 - a. Interior Lining: AWWA C550 or FDA-approved, epoxy coating for backflow preventers having cast-iron or steel body.
 3. Interior Components: Corrosion-resistant materials.
 4. Strainer: On inlet.
- C. Pipe-Applied, Atmospheric-Type Vacuum Breakers: ASSE 1001, with floating disc and atmospheric vent.
- D. Hose-Connection Vacuum Breakers: ASSE 1011, nickel plated, with nonremovable and manual drain features, and ASME B1.20.7, garden-hose threads on outlet. Units attached to rough-bronze-finish hose connections may be rough bronze.
- E. Intermediate Atmospheric-Vent Backflow Preventers: ASSE 1012, suitable for continuous pressure application. Include inlet screen and two independent check valves with intermediate atmospheric vent.

- F. Reduced-Pressure-Principle Backflow Preventers: ASSE 1013, suitable for continuous pressure application. Include gate or ball valves on inlet and outlet, and strainer on inlet; test cocks, and pressure-differential relief valve with ASME A112.1.2 air-gap fitting located between two positive-seating check valves. Unit must be listed by name and number on the State Department of Health approved list of RPZ type valves.
 - 1. Pressure Loss: 12 psig (83 kPa) maximum, through middle 1/3 of flow range.
- G. Hose-Connection Backflow Preventers: ASSE 1052, suitable for at least 3-gpm (0.19-L/s) flow and applications with up to 10-foot head of water (30-kPa) back pressure. Include two check valves; intermediate atmospheric vent; and nonremovable, ASME B1.20.7, garden-hose threads on outlet.
- H. Back-Siphonage Backflow Vacuum Breakers: ASSE 1056, suitable for continuous pressure and backflow applications. Include shutoff valves, check valve, test cocks and vacuum vent.

2.03 BALANCING VALVES

- A. Calibrated Balancing Valves: Adjustable, with two readout ports and memory setting indicator. Include manufacturer's standard hoses, fittings, valves, differential pressure meter, and carrying case.
 - 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:
 - a. Flow Design, Inc. (Nexus Ultra Series)
 - b. ITT Industries; Bell & Gossett Div.
 - 2. NPS 2 (DN 50) and Smaller: Bronze body with brass ball, adjustment knob, calibrated nameplate, and threaded or solder-joint ends.
 - 3. NPS 2 (DN 50) and Smaller: Bronze, Y-pattern body with adjustment knob and threaded ends.
- A. Memory-Stop Balancing Valves, NPS 2 (DN 50) and Smaller: MSS SP-110, ball valve, rated for 400-psig (2760 kPa) minimum CWP. Include two-piece, copper-alloy body with standard or full-port, chrome-plated brass ball, replaceable seats and seals, threaded or solder-joint ends, and vinyl-covered steel handle with memory-stop device.
 - 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:
 - a. Conbraco Industries, Inc.
 - b. Milwaukee Valve Company.
 - c. NIBCO, Inc.

2.04 KEY-OPERATION HYDRANTS

- A. Manufacturers:
 - 1. Josam Co.
 - 2. Smith, Jay R. Mfg. Co.
 - 3. Zurn industries.
 - 4. Mifab.
 - 5. Woodford.

- B. General: ASME A112.21.3M, key-operation hydrant with pressure rating of 125 psig (860 kPa).
 - 1. Inlet: NPS 3/4 or NPS 1 (DN 20 or DN 25) threaded or solder joint.
 - 2. Outlet: ASME B1.20.7, garden-hose threads.
 - 3. Operating Keys: One with each key-operation hydrant.

- C. Nonfreeze Concealed-Outlet Wall Hydrants: ASSE 1019, self-drainable with flush-mounting box with cover, integral nonremovable hose-connection backflow preventer, ceramic disc operating cartridge, casing and operating rod to match wall thickness concealed outlet, and wall clamp.
 - 1. Classification: Type A, for automatic draining with hose removed or Type B, for automatic draining with hose removed or with hose attached and nozzle closed,
 - 2. Box and Cover Finish: Nickel bronze or stainless steel.

2.05 DRAIN VALVES

- A. Hose-End Drain Valves: MSS SP-110, NPS 3/4 (DN 20) ball valve, rate for 400-psig (2760-kPa) minimum CWP. Include two-piece, copper-alloy body with standard port, chrome-plated brass ball, replaceable seats and seals, blowout-proof stem, and vinyl-covered steel handle.
 - 1. Inlet: Threaded or solder joint.
 - 2. Outlet: Short-threaded nipple with ASME B1.20.7, garden-hose threads and cap.

- B. Hose-End Drain Valve: MSS SP-80 gate valve, Class 125, ASTM B 62 bronze body, with NPS 3/4 (DN 20) threaded or solder-joint inlet and ASME B1.20.7, garden-hose threads on outlet and cap. Hose bibbs are prohibited for this application.

2.06 THERMOSTATIC WATER MIXING VALVES

- A. Main Building, thermostatic, Water-Mixing-Valve Assemblies:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Leonard Valve Company.
 - b. Powers; a Watt Industries Co.
 - c. Symmons Industries, Inc.
 - d. Lawler.
 - e. Bradley.
 - 2. Description: Factory-fabricated, exposed-mounting, thermostatically controlled, water-mixing-valve assembly.
 - 3. Thermostatic Mixing Valves: Comply with ASSE 1017. Include check stops on hot-and cold-water inlets and shutoff valve and pressure gauge on outlet.
 - 4. Component Pressure Ratings: 125 psig minimum, unless otherwise indicated.
 - 5. Tempered-Water Settings: 120°F.
 - 6. Unit Tempered-Water Design Flow Rate: Refer to drawings.
 - 7. Unit Minimum Tempered-Water Design Flow Rate: Refer to drawings.
 - 8. Selected Unit Flow Rate at 20 psig Pressure Drop: Refer to drawings.
 - 9. Unit Pressure Drop at Design Flow Rate: 10 psig.
 - 10. Unit Tempered-Water Outlet Size: Refer to drawings.
 - 11. Unit Hot- and Cold-Water Inlet Size: Refer to drawings.

12. Thermostatic Mixing Valve and Water Regulator Finish: Rough bronze.
13. Piping Finish: Bronze.
14. Color coded dial thermometer (0 to 140°F) on outlet.

2.07 HOSE BIBBS

- A. Inside sill faucet:
 1. Available manufacturers:
 - a. Chicago Faucets.
 - b. T&S Brass.
 - c. Zurn.
 2. General: Inside sill fitting with atmospheric vacuum breaker spout, 3/4" hose thread outlet, wheel handle, 3/4" NPT female inlet. Rough chrome finish.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for piping joining materials, joint construction, and basic installation requirements.
- B. Install balancing valves in locations where they can easily be adjusted.
- C. Install water hammer arresters in water piping according to PDI-WH 201.
- D. Install thermostatic mixing valves with check stops or shut-off valves on inlets and shut-off valve and thermometer on outlet.
- E. Install access panels at water hammer arrestors.

3.02 CONNECTIONS

- A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping and specialties.

3.03 FIELD QUALITY CONTROL

- A. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

3.04 LABELING AND IDENTIFYING

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
 1. Calibrated balancing valves.
- B. Nameplates and signs are specified in Division 15 Section "Basic Mechanical Materials and Methods."

END OF SECTION 15430

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SECTION 15450 – DRINKING FOUNTAINS AND WATER COOLERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following water coolers and related components:
 - 1. Fixture supports.

1.03 DEFINITIONS

- A. Accessible Water Cooler: Fixture that can be approached and used by people with disabilities.
- B. Fitting: Device that controls flow of water into or out of fixture.
- C. Fixture: Water cooler unless one is specifically indicated.
- D. Water Cooler: Electrically powered fixture for generating and delivering cooled drinking water.

1.04 SUBMITTALS

- A. Product Data: For each fixture indicated. Include rated capacities, furnished specialties, and accessories.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For fixtures to include in emergency, operation, and maintenance manuals.

1.05 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. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for fixtures for people with disabilities.
- C. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
- D. ARI Standard: Comply with ARI's "Directory of Certified Drinking Water Coolers" for style classifications.

DRINKING FOUNTAINS AND WATER COOLERS

- E. ARI Standard: Comply with ARI 1010, "Self-Contained, Mechanically Refrigerated Drinking-Water Coolers," for water coolers and with ARI's "Directory of Certified Drinking Water Coolers" for type and style classifications.
- F. ASHRAE Standard: Comply with ASHRAE 34, "Designation and Safety Classification of Refrigerants," for water coolers. Provide HFC 134a (tetrafluoroethane) refrigerant, unless otherwise indicated.
- G. Regulatory Requirement: Comply with the Reduction of Lead in Drinking Water Act (42 USC 300G) 2014.

PART 2 - PRODUCTS

2.01 PRESSURE WATER COOLERS

- A. Water Coolers, EWC-1.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the Manufacturers specified:
 - a. Halsey Taylor.
 - b. Elkay.
 - c. Oasis.
 - 2. Description: ARI 1010, Type PB, pressure with bubbler, Style FW, flush-to-wall water cooler with single bottle filling station.
 - a. Cabinet: Vinyl clad, bi-level with two deck/bubbler.
 - b. Bubbler: One, with adjustable stream regulator, located on each deck.
 - c. Control: Push button.
 - d. Supply: NPS 3/8 with ball or globe valve.
 - e. Drain: Grid with NPS 1-1/2 minimum horizontal waste and trap complying with ASME A112.18.2.
 - f. Cooling System: Electric, with precooler, hermetically sealed compressor, cooling coil, air-cooled condensing unit, corrosion-resistant tubing, refrigerant, corrosion-resistant-metal storage tank, and adjustable thermostat.
 - 1) Capacity: 8 gph of 50 deg F cooled water from 80 deg F inlet water and 90 deg F ambient air temperature.
 - 2) Electrical Characteristics: 370 watts; 120-V ac; single phase; 60 Hz.
 - g. Support: Type II, water cooler carrier. Refer to "Fixture Supports" Article.
 - h. Bottle filling station: Sensor-activated with laminar flow and equipped with an automatic 20 second shut-off timer.

2.02 FIXTURE SUPPORTS

- 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:
 - 1. Josam Co.
 - 2. MIFAB Manufacturing, Inc.
 - 3. Smith, Jay R. Mfg. Co.
 - 4. Tyler Pipe; Wade Div.
 - 5. Watts Drainage Products Inc.; a div. of Watts Industries, Inc.
 - 6. Zurn Plumbing Products Group; Specification Drainage Operation.

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- B. Description: ASME A112.6.1M, water cooler carriers. Include vertical, steel uprights with feet and tie rods and bearing plates with mounting studs matching fixture to be supported.
 - 1. Type II: Bilevel, hanger type carrier with 3 vertical uprights, for wall mounted water coolers.
 - 2. Supports for Accessible Fixtures: Include rectangular, vertical, steel uprights instead of steel pipe uprights.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine roughing-in for water and waste piping systems to verify actual locations of piping connections before fixture installation. Verify that sizes and locations of piping and types of supports match those indicated.
- B. Examine walls and floors for suitable conditions where fixtures are to be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 APPLICATIONS

- A. Use carrier off-floor supports for wall mounting fixtures.
- B. Use chrome-plated brass or copper tube, fittings, and valves in locations exposed to view. Plain copper tube, fittings, and valves may be used in concealed locations.

3.03 INSTALLATION

- A. Install fixtures level and plumb. For fixtures indicated for children, install at height required by authorities having jurisdiction.
- B. Install water-supply piping with shutoff valve on supply to each fixture to be connected to water distribution piping. Use ball or globe valve. Install valves in locations where they can be easily reached for operation. Valves are specified in Division 15 "General Duty Valves".
- C. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.
- D. Install pipe escutcheons at wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding pipe fittings. Escutcheons are specified in Division 15 Section "Common Work Results for Plumbing."

3.04 CONNECTIONS

- A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- C. Ground equipment according to Division 16 Section "Grounding."
- D. Connect wiring according to Division 16.

DRINKING FOUNTAINS AND WATER COOLERS

3.05 FIELD QUALITY CONTROL

- A. Water Cooler Testing: After electrical circuitry has been energized, test for compliance with requirements. Test and adjust controls and safeties.
1. Remove and replace malfunctioning units and retest as specified above.
 2. Report test results in writing.

3.06 ADJUSTING

- A. Adjust fixture flow regulators for proper flow and stream height.
- B. Adjust water cooler temperature settings.

3.07 CLEANING

- A. After completing fixture installation, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.
- B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.

END OF SECTION 15450

SECTION 15486 - FUEL-FIRED WATER HEATERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes the following fuel-fired water heaters:
 - 1. Commercial, gas water heaters.
 - 2. Compression tanks.
 - 3. Water heater accessories.

1.03 SUBMITTALS

- A. Product Data: For each type and size of water heater indicated. Include rated capacities, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Product Certificates: For each type of commercial water heater, signed by product manufacturer.
- D. Warranty: Special warranty specified in this Section.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain same type of water heaters through one source from a single manufacturer.
- B. Product Options: Drawings indicate size, profiles, and dimensional requirements of water heaters and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9" for all components that will be in contact with potable water.

1.05 COORDINATION

- A. Coordinate size and location of concrete bases with Architectural and Structural Drawings.

1.06 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-fired water heaters that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Structural failures including storage tank and supports.
 - b. Faulty operation of controls.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use.
 2. Warranty Period(s): From date of Substantial Completion:
 - a. Commercial, Gas Water Heaters:
 - 1) Storage Tank: Three years.
 - 2) Controls and Other Components: One year.
 - b. Compression Tanks: Five years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
- B. Commercial, Gas Water Heaters: Comply with ANSI Z21.10.3/CSA 4.3.
1. Available Manufacturers:
 - a. Bradford White Corporation.
 - b. Laars.
 - c. Lochinvar Corporation
 - d. Smith, A.O. Water Products Company.
 - e. State Industries, Inc.
 2. Description: Manufacturer's proprietary design to provide at least 95 percent thermal efficiency at optimum operating conditions. Following features and attributes may be

- modified or omitted if water heater otherwise complies with requirements for performance.
3. Storage-Tank Construction: Non-ASME-code steel with 125-psig minimum working-pressure rating.
 - a. Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing.
 - 1) NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
 - 2) NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
 - b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - c. Lining: Glass, complying with NSF 61 barrier materials for potable-water tank linings, including extending lining into and through tank fittings and outlets.
 4. Factory-Installed, Storage-Tank Appurtenances:
 - a. Anode Rod: Replaceable magnesium.
 - b. Dip Tube: Provide unless cold-water inlet is near bottom of tank.
 - c. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
 - d. Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire storage tank except connections and controls.
 - e. Jacket: Steel with enameled finish.
 - f. Combination Temperature and Pressure Relief Valves: ANSI Z21.22/CSA 4.4. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.
 5. Burner: For use with atmospheric natural gas water heaters and for natural-gas fuel.
 6. Temperature Control: Adjustable thermostat.
 7. Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems.
 8. Energy Management System Interface: Normally closed dry contacts for enabling and disabling water heater.
 9. Capacity and Characteristics:
 - a. See equipment schedule on drawings.

2.02 COMPRESSION TANKS

- A. Description: Steel, pressure-rated tank constructed with welded joints and factory-installed, butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
 1. Available Manufacturers:
 - a. AMTROL Inc.
 - b. Smith, A. O.; Aqua-Air Div.

FUEL-FIRED WATER HEATERS

- c. State Industries, Inc.
 - d. Taco, Inc.
 - e. Wessels Co.
2. Construction:
- a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
 - b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - c. Air-Charging Valve: Factory installed.
3. Capacity and Characteristics:
- a. See plumbing equipment schedule on drawings.

2.03 WATER HEATER ACCESSORIES

- A. Gas Shutoff Valves: ANSI Z21.15/CGA 9.1, manually operated. Furnish for installation in piping.
 - B. Gas Pressure Regulators: ANSI Z21.18, appliance type. Include pressure rating, capacity, and pressure differential required between gas supply and water heater.
 - C. Gas Automatic Valves: ANSI Z21.21, appliance, electrically operated, on-off automatic valve.
 - D. Combination Temperature and Pressure Relief Valves: Include relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select each relief valve with sensing element that extends into storage tank.
1. Gas Water Heaters: ANSI Z21.22/CSA 4.4.

2.04 SOURCE QUALITY CONTROL

- A. Test and inspect water heater storage tanks, specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.
- B. Prepare test reports.

PART 3 - EXECUTION

3.01 WATER HEATER INSTALLATION

- A. Install commercial water heaters on concrete bases.

1. Concrete base construction requirements are specified in Division 15 Section "Basic Mechanical Materials and Methods."
 - B. Install water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
 - C. Install gas water heaters according to NFPA 54.
 - D. Install gas shutoff valves on gas supplies to gas water heaters without shutoff valves.
 - E. Install gas pressure regulators on gas supplies to gas water heaters without gas pressure regulators if gas pressure regulators are required to reduce gas pressure at burner.
 - F. Install automatic gas valves on gas supplies to gas water heaters, if required for operation of safety control.
 - G. Install combination temperature and pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater, relief-valve outlet, with drain piping same as domestic water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
 - H. Install water heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for water heaters that do not have tank drains. Refer to Division 15 Section "Plumbing Specialties" for hose-end drain valves.
 - I. Install thermometer on outlet piping of water heaters. Refer to Division 15 Section "Common Work Results for Mechanical" for thermometers.
 - J. Install pressure gage on outlet piping of commercial, fuel-fired water heater piping. Refer to Division 15 Section "Common Work Results for Mechanical" for pressure gages.
 - K. Install piping-type heat traps on inlet and outlet piping of water heater storage tanks without integral or fitting-type heat traps.
 - L. Fill water heaters with water.

3.02 CONNECTIONS

- A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to water heaters to allow service and maintenance. Arrange piping for easy removal of water heaters.
- C. Ground equipment according to Division 16 Section "Grounding and Bonding."
- D. Connect wiring according to Division 16 Section "Conductors and Cables."

FUEL-FIRED WATER HEATERS

3.03 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, confirm proper operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Remove and replace water heaters that do not pass tests and inspections and retest as specified above.

END OF SECTION 15486

SECTION 15532 – OUTDOOR, IN-DIRECT GAS-FIRED HEATING AND VENTILATING UNITS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes in-direct-fired H&V units.
- B. It shall be the work of this section to coordinate with section 15900 to ensure a complete and workable system.
- C. It shall be the work of this section to coordinate with pre-engineered building manufacturer concerning size and location of inlet air duct and work platform.
- D. Related Sections include the following:
 - 1. Division 15 Section "Instrumentation and Controls".
 - 2. Division 15 Section "Testing, Adjusting, and Balancing".

1.03 SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection. Prepare the following by or under the supervision of a qualified professional engineer:
 - 1. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.
 - 2. Wiring Diagrams: Power, signal, and control wiring.
- C. Operation and Maintenance Data: For direct-fired H&V units to include in operation and maintenance manuals.
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of direct-fired H&V units and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."
- E. 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.
- F. Comply with NFPA 70.
- G. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

OUTDOOR, IN-DIRECT GAS-FIRED HEATING AND VENTILATING UNITS

- H. ASHRAE/IESNA 90.1-2004 Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.04 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Filters: One set(s) for each unit.
 2. Fan Belts: One set(s) for each unit.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Reznor
 2. Greenheck.
 3. Modine Mfg. Co.;
 4. Rapid Engineering, Inc.
 5. Trane Company (The); Unitary Products Group.

2.02 PACKAGED UNITS

- A. Factory-assembled, prewired, self-contained unit consisting of cabinet, supply fan, controls, filters and in-direct-fired gas furnace to be installed on rooftop.

2.03 CABINET

- A. Cabinet: Single-wall galvanized-steel panels, formed to ensure rigidity and supported by galvanized-steel channels or structural channel supports with lifting lugs.
1. Provide outside air and return air damper section
- B. Access Panels: Piano hinged with cam-lock fasteners for furnace and fan motor assemblies on both sides of unit.
- C. Internal Insulation: Fibrous-glass duct lining, comply with ASTM C 1071, Type II, applied throughout.
1. Thickness: 1 inch.
 2. Insulation Adhesive: Comply with ASTM C 916, Type I.
 3. Mechanical Fasteners: Galvanized steel suitable for adhesive attachment, mechanical attachment, or welding attachment to casing without damaging liner when applied as recommended by manufacturer and without causing air leakage.
 4. Insulation shall be foil faced. All exposed edges of insulation shall be covered so no exposed fiberglass is in airstream.
- D. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

OUTDOOR, IN-DIRECT GAS-FIRED HEATING AND VENTILATING UNITS

2.04 SUPPLY-AIR FAN

- A. Fan Type: Centrifugal, rated according to AMCA 210; statically and dynamically balanced, galvanized steel; mounted on solid-steel shaft with permanently lubricated bearings.
- B. Motor: Totally enclosed, single-speed motor.
- C. Drive: V-belt drive with matching fan pulley and adjustable motor sheaves and belt assembly.
- D. Mounting: Fan wheel, motor, and drives shall be mounted in fan casing with spring isolators.

2.05 AIR FILTERS

- A. Comply with NFPA 90A.
- B. Disposable Panel Filters: 2-inch-thick, factory-fabricated, flat-panel-type, disposable air filters with holding frames, with a minimum efficiency report value (MERV) of 8 according to ASHRAE 52.2 and 90 percent average arrestance according to ASHRAE 52.1.
 - 1. Frame: Galvanized steel.

2.06 DAMPERS

- A. Outdoor-Air and Return-Air Damper: Field installed
 - 1. Damper and operators by section 15900

2.07 IN-DIRECT-FIRED GAS FURNACE

- A. Description: Factory assembled, piped, and wired; and complying with ANSI Z83.4, "Direct Gas-Fired Make-Up Air Heaters"; ANSI Z83.18, "In-Direct Gas-Fired Industrial Air Heaters"; and NFPA 54, "National Fuel Gas Code."
- B. Inside Unit External Housing: Steel cabinet with integral support inserts.
- C. Burners: Modulating stainless steel burner with stainless-steel mixing plates.
 - 1. Control Valve: Modulating with minimum turndown ratio of 40%.
 - 2. Fuel: Natural gas.
 - 3. Pilot: Electrically ignited by hot-surface ceramic igniter.
 - 4. Provide gas pressure regulator as required to match site conditions.
- D. Heat Exchanger: Stainless Steel.
- E. Safety Controls:
 - 1. Gas Manifold: Safety switches and controls to comply with IRI standards.
 - 2. Purge-Period Timer: Automatically delays burner ignition and bypasses low-limit control.
 - 3. Airflow Proving Switch: Dual pressure switch senses correct airflow before energizing pilot and requires airflow to be maintained within minimum and maximum pressure settings across burner.

OUTDOOR, IN-DIRECT GAS-FIRED HEATING AND VENTILATING UNITS

4. Manual-Reset, High-Limit Control Device: Stops burner and closes main gas valve if high-limit temperature is exceeded.
5. Gas Train: Gas valve shall be fully modulating (electronic modulation).
6. Safety Lockout Switch: Locks out ignition sequence if burner fails to light after three tries. Controls are reset manually by turning the unit off and on.
7. Control Transformer: Integrally mounted 24-V ac.

2.08 CONTROLS

- A. Factory-wired, fuse-protected control transformer, connection for power supply and field-wired unit to remote control panel.
 1. Control Panel: Unit shall include DDC compatible controls for integration into energy management system. See Section 15900 for controls requirements.
 2. Control panel shall be Maxitrol or equal and shall use an external 0-10 V dc signal from 15900 to control the discharge air temperature. The control signal to the fully electronic modulating gas valve shall be from 15900. The unit shall include a high-limit discharge air temperature sensor.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting installation of direct-fired H&V units.
- B. Examine roughing-in for piping, ducts, and electrical systems to verify actual locations of connections before equipment installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install gas-fired units according to NFPA 54, "National Fuel Gas Code."
- B. Install controls and equipment shipped by manufacturer for field installation with indirect-fired H&V units.

3.03 CONNECTIONS

- A. Piping Connections: Drawings indicate general arrangement of piping, fittings, and specialties. Install piping adjacent to machine to allow service and maintenance.
 1. Gas Piping: Comply with requirements in Division 15 Section "Facility Natural-Gas Piping." Connect gas piping with shutoff valve and union and with sufficient clearance for burner removal and service. Provide AGA-approved flexible connectors.
- B. Duct Connections: Duct installation requirements are specified in Division 15 Section "Metal Ducts." Drawings indicate the general arrangement of ducts.

Connect supply duct to indirect-fired H&V units with flexible duct connectors. Flexible duct connectors are specified in Division 15 Section "Duct Accessories."

OUTDOOR, IN-DIRECT GAS-FIRED HEATING AND VENTILATING UNITS

- C. Ground equipment according to Division 16 Section "Grounding."

3.04 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
- B. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
 - 1. Inspect for visible damage to furnace combustion chamber.
 - 2. Inspect casing insulation for integrity, moisture content, and adhesion.
 - 3. Verify that clearances have been provided for servicing.
 - 4. Verify that controls are connected and operable.
 - 5. Verify that filters are installed.
 - 6. Purge gas line.
 - 7. Inspect and adjust vibration isolators.
 - 8. Verify bearing lubrication.
 - 9. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
 - 10. Adjust fan belts to proper alignment and tension.
 - 11. Start unit according to manufacturer's written instructions.
 - 12. Complete startup sheets and attach copy with Contractor's startup report.
 - 13. Inspect and record performance of interlocks and protective devices; verify sequences.
 - 14. Operate unit for run-in period recommended by manufacturer.
 - 15. Perform the following operations for both minimum and maximum firing and adjust burner for peak efficiency:
 - a. Measure gas pressure on manifold.
 - b. Measure combustion-air temperature at inlet to combustion chamber.
 - c. Measure supply-air temperature and volume when burner is at maximum firing rate and when burner is off. Calculate useful heat to supply air.
 - 16. Adjust and inspect high-temperature limits.
 - 17. Inspect dampers, if any, for proper stroke and interlock with return-air dampers.
 - 18. Inspect controls for correct sequencing of heating, mixing dampers, and normal and emergency shutdown.
 - 19. Measure and record airflow. Plot fan volumes on fan curve.
 - 20. Verify operation of remote panel, including pilot-operation and failure modes. Inspect the following:
 - a. High-limit heat.
 - b. Alarms.
 - 21. After startup and performance testing, change filters, verify bearing lubrication, and adjust belt tension.
- C. Remove and replace malfunctioning components that do not pass tests and inspections and retest as specified above.
- D. Prepare written report of the results of startup services.

3.05 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain direct-fired H&V units.

END OF SECTION 15532

SECTION 15730 – PACKAGED ROOFTOP AIR CONDITIONING UNITS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Package roof top unit.
 - 1. Heat exchanger.
 - 2. Refrigeration components.
 - 3. Unit operating controls.
 - 4. Roof curb.
 - 5. Electrical power connections.
 - 6. Operation and maintenance service.

1.02 RELATED SECTIONS

- A. Section “Metal Ductwork.”
- B. Section “Controls and Instrumentation.”

1.03 REFERENCES

- A. NFPA 90 A & B - Installation of Air Conditioning and Ventilation Systems and Installation of Warm Air Heating and Air Conditioning Systems.
- B. ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration.
- C. AHRI 360 - Commercial and Industrial Unitary Air Conditioning Equipment testing and rating standard. (g/e, c/e above 135,000 btuh)
- D. ANSI/ASHRAE/IESNA 90.1-1999 - Energy Standard for New Buildings Except Low-Rise Residential Buildings.
- E. ANSI Z21.47/UL1995 - Unitary Air Conditioning Standard for safety requirements.
- F. AHRI 370 - Sound Rating of Large Outdoor Refrigerating and Air Conditioning Equipment.(all above 135,000 Btuh)
- G. ANSI/NFPA 70-1995 - National Electric Code. (all).

1.04 SUBMITTALS

- A. Submit unit performance data including: capacity, nominal and operating performance.
- B. Submit shop drawings indicating overall dimensions as well as installation, operation and services clearances.
- C. Submit data on electrical requirements and connection points. Include recommended wire and fuse sizes or MCA, sequence of operation, safety and start-up instructions.

PACKAGED ROOFTOP AIR CONDITIONING UNITS

1.05 DELIVERY, STORAGE and HANDLING

- A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.
- B. Protect units from physical damage. Leave factory-shipping covers in place until installation.

1.06 WARRANTY

- A. Provide labor and parts warranty for one year from start-up
 - 1. Provide five-year extended warranty for compressors.
 - 2. Provide five-year heat exchanger limited warranty.

1.07 EXTRA MATERIALS

- A. Provide one set of filters.
- B. Furnish a complete set of fan motor drive belts.

PART 2 - PRODUCTS

2.01 SUMMARY

- A. The contractor shall furnish and install package rooftop unit(s) as shown and scheduled on the contract documents. The unit(s) shall be installed in accordance with this specification and perform at the specified conditions as scheduled.
- B. APPROVED MANUFACTURERS: subject to compliance with the requirements, provide equipment from one of the following:
 - 1. Trane
 - 2. Carrier
 - 3. Johnson/York
 - 4. McQuay
 - 5. Aeon

2.02 GENERAL UNIT DESCRIPTION

- A. Packaged rooftop (s) as scheduled Unit(s) shall consist of insulated weather-tight casing with compressor(s), air-cooled condenser coil, condenser fans, evaporator coil, filters, supply motors and unit controls.
- B. Unit(s) shall be 100% factory run tested and fully charged with R-410A.

2.03 UNIT CASING

- A. Cabinet: Galvanized steel, phosphatized, and finished with an air-dry paint coating with removable access panels. Structural members shall be 18 gauge with access doors and removable panels of minimum 20 gauge.

PACKAGED ROOFTOP AIR CONDITIONING UNITS

- B. Cabinet top cover shall be one piece construction or where seams exist, it shall be double-hemmed and gasket-sealed.
- C. Access Panels: Water- and air-tight hinged panels with handles shall provide access to filters, heating section, return air fan section, supply air fan section, evaporator coil section, and unit control section.
- D. Insulation: Provide 1/2 inch thick fiberglass insulation with foil face on all exterior panels in contact with the return and conditioned air stream. All edges must be captured so that there is no insulation exposed in the air stream.

2.04 AIR FILTERS

- A. Air Filters: Factory installed filters shall mount integral within the unit and shall be accessible through access panels.
- B. 2 inch thick filters, MERV-8 minimum.

2.05 FANS AND MOTORS

- A. Outdoor and Indoor Fan shall be permanently lubricated and have internal thermal overload protection.
- B. Outdoor fans shall be direct drive, statically and dynamically balanced, draw through in the vertical down discharge position.

2.06 SINGLE ZONE VARIABLE AIR VOLUME

- A. Unit shall be provided with VFD (Variable Frequency Drive) on Indoor fan motor. VFD shall change fan speed according to mode of operation.
 - 1. During cooling mode, fan shall modulate to maintain space temperature. the compressor shall operate to control discharge air temperature.
 - 2. During heating operation, control will be through modulating gas heat only.

2.07 GAS FIRED HEATING SECTION

- A. Completely assembled and factory installed heating system shall be integral to unit, UL or CSA approved specifically for outdoor applications for use downstream from refrigerant cooling coils.
- B. Heating section shall be factory run tested prior to shipment.
- C. Modulating gas heat.
- D. Gas Burner Safety Controls: Provide safety controls for the proving of combustion air prior to ignition, and continuous flame supervision. Provide flame rollout switches.
- E. Induced draft blower shall have combustion air proving switches and built-in thermal overload protection on fan motor.
- F. Heat Exchanger: Provide tubular section type constructed from 18-gauge aluminized steel.

PACKAGED ROOFTOP AIR CONDITIONING UNITS

- G. Burners: Burners shall be of the in-shot type constructed of stainless steel.
- H. Limit controls: High temperature limit controls will shut off gas flow in the event of excessive temperatures resulting from restricted indoor airflow or loss of indoor airflow.

2.08 EVAPORATOR COIL

- A. Provide configured aluminum fin surface mechanically bonded to copper tubing coil.
- B. Provide an independent expansion device for each refrigeration circuit. Factory pressure tested at 450 psig and leak tested at 200 psig.
- C. Provide a double sloped drain pan

2.09 CONDENSER SECTION

- A. Provide vertical discharge, direct drive fans with aluminum blades. Fans shall be statically balanced. Motors shall be permanently lubricated, with integral thermal overload protection in a weather tight casing.
 - 1. Provide hale guards for all vertical exposed condenser coils

2.10 REFRIGERATION SYSTEM

- A. Compressor(s): Provide scroll compressor with direct drive operating at 3600 rpm. Integral centrifugal oil pump. Provide suction gas cooled motor with winding temperature limits and compressor overloads.
- B. Provide each unit with refrigerant circuit(s) factory-supplied completely piped with liquid line filter-drier, suction and liquid line pressure ports.
- C. Unit shall be capable of operating at 50% capacity or below. This may be accomplished by compressor staging/variable speed/or digital scroll.

2.11 OUTDOOR AIR SECTION

- A. Provide spring return motor for outside air damper closure during unit shutdown or power interruption.
- B. Power exhauster shall be factory mounted and wired. Exhauster shall be placed out of the way of the return air stream so fan only operates during economizer mode. See plans for sizing info.

2.12 OPERATING CONTROLS

- A. Provide microprocessor unit-mounted DDC control which when used with an electronic zone sensor provides proportional integral room control. This controller shall perform all unit functions by making all heating, cooling, and ventilating decisions through resident software logic.
 - 1. Operation to be (see sequence) VAV.
 - 2. Provide return air CO2 sensor for outside air control, set point to be 1100 ppm.
 - 3. MFGR shall provide, mount, and wire a programmable thermostat. Thermostat may be combination temperature and CO2 sensor if desired.

PACKAGED ROOFTOP AIR CONDITIONING UNITS

4. There shall be no connection to BMS, all control function is internal to this specification section.
- B. Provide factory-installed indoor evaporator defrost control to prevent compressor slugging by interrupting compressor operation.
- C. Provide an anti-cycle timing and minimum on/off between stages timing in the microprocessor.
- D. Provide phase loss protection.

2.13 ROOF CURB

- A. Contractor shall provide factory supplied roof curb, 16 gauge perimeter made of zinc coated steel with supply and return air gasketing and wood nailer strips.
 1. Curb shall be manufactured in accordance with the National Roofing Contractors Association guidelines.
 2. Minimum height is 12"
 3. Insulation: 2" minimum

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Contractor shall verify that roof is ready to receive work and opening dimensions are as Contractor shall verify that proper power supply is available.

3.02 INSTALLATION

- A. Level roof curbs as required to match sloped structure.
- B. Contractor shall install in accordance with manufacturer's instructions.
- C. Mount units on factory built roof mounting frame providing watertight enclosure to protect ductwork and utility services. Install roof mounting curb level.

END OF SECTION 15730

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SECTION 15768 - FUEL-FIRED UNIT HEATERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes gas fired unit heaters.

1.03 SUBMITTALS

- A. Product Data: For each type of fuel-fired unit heater indicated. Include rated capacities, operating characteristics, and accessories.
- B. Shop Drawings:
 - 1. Unit heater flue, including field verified horizontal and vertical dimensions.
 - 2. Wiring Diagrams: Power, signal, and control wiring.

1.04 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. ASHRAE/IESNA 90.1-2004 Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.05 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace heat exchanger of fuel-fired unit heater that fails in materials or workmanship within specified warranty period.
 - 1. Warranty Period for heat exchanger: Five years from date of Substantial Completion.

1.06 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

FUEL-FIRED UNIT HEATERS

1. Fan Belts: One for each belt-driven fan size.

PART 2 - PRODUCTS

2.01 GAS-FIRED UNIT HEATERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Lennox Industries, Inc.
 2. Modine Manufacturing Company.
 3. Reznor/Thomas & Betts Corporation.
 4. Sterling HVAC Products; Div. of Mestek Technology Inc.
 5. Trane
- B. Description: High efficiency (90%+) gas fired unit heaters. Factory assembled, piped, and wired, and complying with ANSI Z83.8/CSA 2.6.
- C. Fuel Type: Design burner for natural gas having characteristics same as those of gas available at Project site.
 1. Provide gas pressure regulators as required to comply with site conditions.
- D. Type of Venting: PVC plastic pipe, with concentric combustion air/vent fitting for sidewall installation
- E. Housing: Steel, with integral inserts for suspension mounting rods.
 1. External Casings and Cabinets: Baked enamel over corrosion-resistant-treated surface.
 2. Suspension Attachments: Reinforce suspension attachments at connection to fuel-fired unit heaters.
- F. Heat Exchanger: Aluminized steel.
- G. Burner Material: Aluminized steel with stainless-steel inserts
- H. Unit Fan: Formed-steel or Aluminum propeller blades riveted to heavy-gage steel spider bolted to cast-iron hub, dynamically balanced, and resiliently mounted.
 1. Fan-Blade Guard: Galvanized steel, complying with OSHA specifications, removable for maintenance.
- I. Controls: Regulated redundant gas valve containing pilot solenoid valve, electric gas valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff all in one body.
 1. Gas Control Valve: Single stage
 2. Ignition: Electronically controlled electric spark with flame sensor
 3. Fan Thermal Switch: Operates fan on heat-exchanger temperature.
 4. Control transformer.

FUEL-FIRED UNIT HEATERS

5. High Limit: Thermal switch or fuse to stop burner.
6. Thermostat: Single-stage, wall-mounting type with 50 to 90 deg F (10 to 32 deg C) operating range and fan on switch.

J. Discharge Louvers: Independently adjustable horizontal blades.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install and connect gas-fired unit heaters and associated fuel and vent features and systems according to NFPA 54, applicable local codes and regulations, and manufacturer's written installation instructions.
- B. Suspended Units: Suspend from substrate using threaded rods, spring hangers, and building attachments. Secure rods to unit hanger attachments. Adjust hangers so unit is level and plumb.
 1. Restrain the unit to resist code-required horizontal acceleration.

END OF SECTION 15768

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SECTION 15815 - METAL DUCTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes rectangular, round, and flat-oval metal ducts and plenums for heating, ventilating, and air-conditioning systems in pressure classes from minus 2- to plus 10-inch wg (minus 500 to plus 2490 Pa).
- B. Work of this section includes sealing of existing ductwork, see plans for locations.
- C. Related Sections include the following:
 - 1. Division 15 Section "Mechanical Insulation" for duct insulation.
 - 2. Division 15 Section "Duct Accessories" for dampers, sound-control devices, duct-mounted access doors and panels, turning vanes, and flexible ducts.
 - 3. Division 15 Section "Diffusers, Registers and Grilles."
 - 4. Division 15 Section "Testing, Adjusting, and Balancing" for air balancing and final adjusting of manual-volume dampers.

1.03 SUBMITTALS

- A. Product Data:
 - 1. For factory fabricated duct, duct liner.
 - 2. Fungicidal duct coating.
 - 3. Sealing materials.

1.04 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," unless otherwise indicated.
- B. Comply with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems," unless otherwise indicated.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sealant and firestopping materials to site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle sealant and firestopping materials according to manufacturer's written recommendations.
- C. Deliver and store stainless-steel sheets with mill-applied adhesive protective paper maintained through fabrication and installation.

METAL DUCTS

PART 2 - PRODUCTS

2.01 SHEET METAL MATERIALS

- A. Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 (Z275) coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.
- B. Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- C. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for 36-inch (900-mm) length or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.02 PRESSURE CLASS

- A. Supply duct upstream of VAV terminals = positive 5"
- B. All other supply duct = positive 3"
- C. Return, outside air and exhaust duct = negative 2"

2.03 PAINTING

- A. All ductwork installed in exposed areas shall have "paint grip" finish, be cleaned, prepped, and ready to accept paint.

2.04 DUCT LINER

- A. General: Comply with NFPA 90A or NFPA 90B and NAIMA's "Fibrous Glass Duct Liner Standard."
- B. Materials: ASTM C 1071 with coated surface exposed to airstream to prevent erosion of glass fibers.
 - 1. Thickness: 1 inch (25 mm).
 - 2. Thermal Conductivity (k-Value): 0.25 at 75 deg F (0.037 at 24 deg C) mean temperature.
 - 3. Fire-Hazard Classification: Maximum flame-spread rating of 25 and smoke-developed rating of 50, when tested according to ASTM C 411.
 - 4. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and ASTM C 916.
 - 5. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in duct.
 - a. Tensile Strength: Indefinitely sustain a 50-lb- (23-kg-) tensile, dead-load test perpendicular to duct wall.
 - b. Fastener Pin Length: As required for thickness of insulation and without projecting more than 1/8 inch (3 mm) into airstream.
 - c. Adhesive for Attaching Mechanical Fasteners: Comply with fire-hazard classification of duct liner system.

METAL DUCTS

- C. Manufacturers:
1. Acceptable products shall be equal to Certain Teed Tough Gard R Duct Liner with enhanced surface.
 2. The liner shall meet the Life Safety Standards as established by NFPA 90A and 90B, FHC 25/50 and Limited Combustibility and the airstream surface coating should contain an immobilized, EPA-registered, anti-microbial agent so it will not support microbial growth as tested in accordance with ASTM G21 and G220. The duct liner shall conform to the requirements of ASTM C 1071, with an NRC not less than .70 as tested per ASTM C 423 using a Type "A" mounting.
 3. Material Handling and Storage. The liner shall be kept clean and dry during transportation, storage and installation. Care should be taken to protect the liner from exposure to the elements or damage from mechanical abuse.

2.05 SEALANT MATERIALS

- A. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.
1. Joint and Seam Sealant: One-part, nonsag, solvent-release-curing, polymerized butyl sealant, formulated with a minimum of 75 percent solids.
 2. Flanged Joint Mastics: One-part, acid-curing, silicone, elastomeric joint sealants, complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.

2.06 HANGERS AND SUPPORTS

- A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for building materials.
1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches (100 mm) thick.
 2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches (100 mm) thick.
- B. Hanger Materials: Galvanized, sheet steel or round, threaded steel rod.
1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rod or galvanized rods with threads painted after installation.
 2. Straps and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for sheet steel width and thickness and for steel rod diameters.
- C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- D. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.
1. Supports for Galvanized-Steel Ducts: Galvanized steel shapes and plates.
 2. Supports for Stainless-Steel Ducts: Stainless-steel support materials.
 3. Supports for Aluminum Ducts: Aluminum support materials, unless materials are electrolytically separated from ductwork.

2.07 RECTANGULAR DUCT FABRICATION

- A. General: Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction with galvanized, sheet steel, according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

METAL DUCTS

Comply with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.

- B. Static-Pressure Classifications: Unless otherwise indicated, construct ducts to the following:
 - 1. Supply Ducts: 3-inch wg.
 - 2. Return Ducts: 2-inch wg, negative pressure.
 - 3. Exhaust Ducts: 2-inch wg, negative pressure.

2.08 SHOP APPLICATION OF LINER IN RECTANGULAR DUCTS

- A. Adhere a single layer of indicated thickness of duct liner with 90 percent coverage of adhesive at liner contact surface area. Multiple layers of insulation to achieve indicated thickness are prohibited.
- B. Apply adhesive to liner facing in direction of airflow not receiving metal nosing.
- C. Butt transverse joints without gaps and coat joint with adhesive.
- D. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
- E. Do not apply liners in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and standard liner product dimensions make longitudinal joints necessary.
- F. Secure liner with mechanical fasteners 4 inches (100 mm) from corners and at intervals not exceeding 12 inches (300 mm) transversely around perimeter; at 3 inches (75 mm) from transverse joints and at intervals not exceeding 18 inches (450 mm) longitudinally.
- G. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profile or are integrally formed from duct wall. Fabricate edge facings at the following locations:
 - 1. Intervals of lined duct preceding unlined duct.
 - 2. Fan Discharge.
- H. Terminate liner with duct buildouts installed in ducts to attach dampers, turning vane assemblies, and other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct wall with bolts, screws, rivets, or welds. Terminate liner at fire dampers at connection to fire-damper sleeve.
- I. Spray liner with Fungicidal duct coating per manufacturer's recommendations.

2.09 ROUND AND FLAT-OVAL DUCT FABRICATION

- A. General: Diameter as applied to flat-oval ducts in this Article is the diameter of the size of round duct that has a circumference equal to perimeter of a given size of flat-oval duct.
- B. Static-Pressure Classifications: Unless otherwise indicated, construct round and flat oval ducts to the following:
 - 1. Supply Ducts: 3-inch wg.

METAL DUCTS

- C. Round Ducts: Fabricate supply ducts of galvanized steel according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- D. Flat-Oval Ducts: Fabricate supply ducts with standard spiral lock seams or with butt-welded longitudinal seams according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- E. Double-Wall (Insulated) Ducts: Fabricate double-wall (insulated) ducts with an outer shell and an inner liner. Dimensions indicated on internally insulated ducts are inside dimensions.
 - 1. Thermal Conductivity (k-Value): 0.26 at 75 deg F (0.037 at 24 deg C) mean temperature.
 - 2. Outer Shell: Base outer-shell metal thickness on actual outer-shell dimensions. Fabricate outer-shell lengths 2 inches (50 mm) longer than inner shell and insulation, and in metal thickness specified for single-wall duct.
 - 3. Insulation: 1-inch- (25-mm-) thick fibrous-glass insulation, unless otherwise indicated. Terminate insulation where internally insulated duct connects to single-wall duct or uninsulated components. Terminate insulation and reduce outer duct diameter to inner liner diameter.
 - 4. Perforated Inner Liner: Fabricate round and flat-oval inner liners with sheet metal having 3/32-inch- (2.4-mm-) diameter perforations, with an overall open area of 23 percent. Use the following sheet metal thicknesses and seam construction:
 - a. Ducts 3 to 8 Inches (75 to 200 mm) in Diameter: 0.019 inch (0.5 mm) with standard spiral seam construction.
 - b. Ducts 9 to 42 Inches (225 to 1070 mm) in Diameter: 0.019 inch (0.5 mm) with single-rib spiral seam construction.
 - c. Ducts 44 to 60 Inches (1120 to 1525 mm) in Diameter: 0.022 inch (0.55 mm) with single-rib spiral seam construction.
 - d. Ducts 62 to 88 Inches (1575 to 2235 mm) in Diameter: 0.034 inch (0.85 mm) with standard spiral seam construction.
 - 5. Maintain concentricity of liner to outer shell by mechanical means. Retain insulation from dislocation by mechanical means.

2.10 ROUND AND FLAT-OVAL SUPPLY FITTING FABRICATION

- A. 90-Degree Tees and Laterals and Conical Tees: Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," with metal thicknesses specified for longitudinal seam straight duct.
- B. Diverging-Flow Fittings: Fabricate with a reduced entrance to branch taps with no excess material projecting from body onto branch tap entrance.
- C. Elbows: Fabricate in die-formed, gored, pleated, or mitered construction. Fabricate bend radius of die-formed, gored, and pleated elbows one and one-half times elbow diameter.

2.11 ROUND AND FLAT-OVAL SUPPLY FITTING FABRICATION

- A. 90-Degree Tees and Laterals and Conical Tees: Fabricate to comply with SMACNA's "HVAC Duct Construction Standards-Metal and Flexible," with metal thicknesses specified for longitudinal seam straight duct.

- B. Diverging-Flow Fittings: Fabricate with a reduced entrance to branch taps with no excess material projecting from body onto branch tap entrance.
- C. Elbows: Fabricate in die-formed, gored, pleated, or mitered construction. Fabricate bend radius of die-formed, gored, and pleated elbows and one and one-half times elbow diameter.

PART 3 - EXECUTION

3.01 DUCT INSTALLATION, GENERAL

- A. Duct installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of ducts, fittings, and accessories.
 - 1. Outer shell: Base outer shell metal thickness on actual outer shell dimensions. Fabricate outer shell lengths 2 inches longer than inner shell and insulation use the same metal thickness for outer duct as for uninsulated fittings.
- B. Construct and install each duct system for the specific duct pressure classification indicated.
- C. Install round and flat-oval ducts in lengths not less than 12 feet (3.7 m), unless interrupted by fittings.
- D. Install ducts with fewest possible joints.
- E. Install fabricated fittings for changes in directions, changes in size and shape, and connections.
- F. Install couplings tight to duct wall surface with a minimum of projections into duct.
- G. Install ducts, unless otherwise indicated, vertically and horizontally, parallel and perpendicular to building lines; avoid diagonal runs.
- H. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- I. Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thickness.
- J. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions, unless specifically indicated.
- K. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.
- L. Electrical Equipment Spaces: Route ductwork to avoid passing through transformer vaults and electrical equipment spaces and enclosures.
- M. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same metal thickness as duct. Overlap opening on four sides by at least 1-1/2 inches (38 mm).

- N. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire damper, sleeve, and firestopping sealant. Fire and smoke dampers are specified in Division 15 "Duct Accessories." Firestopping materials and installation methods are specified in Division 7 Section "Firestopping."

3.02 SEAM AND JOINT SEALING

- A. General: Seal duct seams and joints according to the duct pressure class indicated and as described in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Pressure Classification Less Than 2-Inch wg (500 Pa): Transverse joints.
- C. Seal externally insulated ducts before insulation installation.
- D. See plans for location and extent of sealing of existing ductwork.

3.03 HANGING AND SUPPORTING

- A. Install rigid round, rectangular, and flat-oval metal duct with support systems indicated in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Support horizontal ducts within 24 inches (600 mm) of each elbow and within 48 inches (1200 mm) of each branch intersection.
- C. Support vertical ducts at a maximum interval of 16 feet (5 m) and at each floor.
- D. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.
- E. Install concrete inserts before placing concrete.
- F. Install powder-actuated concrete fasteners after concrete is placed and completely cured.

3.04 TESTING DUCTWORK FOR AIR LEAKAGE

- A. Perform tests prior to application of insulation.
- B. When all of the main duct runs have been installed but prior installation of grilles and terminal devices a ductwork leakage test shall be performed. When tested each system shall not exceed air leakage rate of test procedure. Submit appropriate forms indicating which system was tested, conditions under which ductwork was tested and conclusions as a result of testing to the Engineer for approval.
- C. Test Procedure: Applicable respective SMACNA Standards, United McGill or approved equal by Engineer prior to testing.

3.05 CONNECTIONS

- A. Connect equipment with flexible connectors according to Division 15 Section "Duct Accessories."

METAL DUCTS

- B. For branch, outlet and inlet, and terminal unit connections, comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

3.06 DUCT LINERS

- A. All portions of duct designed to receive duct liner shall be completely covered with 1 inch (125 mm) thick lining. The smooth, black, acrylic-coated surfaces of the Permacote Linacoustic shall face the airstream. All Permacote Linacoustic shall be cut to assure tight, overlapped corner joints. The top pieces shall be support by the side pieces.
- B. The lining shall be installed following the guidelines in the NAIMA 'Duct Liner Installation Standard.'
- C. The lining shall be adhered to the sheet metal with full coverage of an approved adhesive that conforms to ASTM C 916, and all exposed leading edges and transverse joints shall be coated with Permacote factory-applied or field-applied edge coating and shall be neatly butted without gaps. Shop or field cuts shall be liberally coated with an Edge Treatment or approved adhesive.
- D. Metal nosings shall be securely installed over transversely-oriented liner edges facing the airstream at forward discharge and at any point where lined duct is preceded by unlined duct.
- E. When velocity exceeds 4000 fpm (20.3 m/sec), use metal nosing on every leading edge. Nosing may be formed on duct or be channel or zee attached by screws, rivets or welds.
- F. The lining shall be additionally secured with mechanical fasteners spaced per the manufacturer's instructions. The pin length should be such as to hold the material firmly in place with minimum compression of the material.

END OF SECTION 15815

SECTION 15820 – DUCT ACCESSORIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Manual-volume dampers.
 - 2. Turning vanes.
 - 3. Duct-mounted access doors and panels.
 - 4. Flexible ducts.
 - 5. Flexible connectors.
 - 6. Duct accessory hardware.
- B. Related Sections include the following:
 - 1. Division 15 "Ductwork"
 - 2. Division 15 Section "Diffusers, Registers, and Grilles."

1.03 SUBMITTALS

- A. Product Data: For the following:
 - 1. All items furnished this section.

1.04 QUALITY ASSURANCE

- A. NFPA Compliance: Comply with the following NFPA standards:
 - 1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
 - 2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 - PRODUCTS

2.01 SHEET METAL MATERIALS

- A. Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 (Z275) coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.
- B. Carbon-Steel Sheets: ASTM A 366/A 366M, cold-rolled sheets, commercial quality, with oiled, exposed matte finish.
- C. Aluminum Sheets: ASTM B 209 (ASTM B 209M), Alloy 3003, Temper H14, sheet form; with standard, one-side bright finish for ducts exposed to view and mill finish for concealed ducts.
- D. Extruded Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6063, Temper T6.

DUCT ACCESSORIES

- E. Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- F. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for 36-inch (900-mm) length or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.02 MANUAL-VOLUME DAMPERS

- A. General: Factory fabricated with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.
 - 1. Pressure Classifications of 3-Inch wg (750 Pa) or Higher: End bearings or other seals for ducts with axles full length of damper blades and bearings at both ends of operating shaft.
- B. Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.
- C. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch- (2.4-mm-) thick zinc-plated steel, and a 3/4-inch (19-mm) hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

2.03 TURNING VANES

- A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Manufactured Turning Vanes: Fabricate of 1-1/2-inch- (38-mm-) wide, curved blades set 3/4 inch (19 mm) o.c.; support with bars perpendicular to blades set 2 inches (50 mm) o.c.; and set into side strips suitable for mounting in ducts.

2.04 DUCT-MOUNTED ACCESS DOORS AND PANELS

- A. General: Fabricate doors and panels airtight and suitable for duct pressure class.
- B. Frame: Galvanized, sheet steel, with bend-over tabs and foam gaskets.
- C. Door: Double-wall, galvanized, sheet metal construction with insulation fill and thickness, and number of hinges and locks as indicated for duct pressure class. Include vision panel where indicated. Include 1-by-1-inch (25-by-25-mm) butt or piano hinge and cam latches.
- D. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.
- E. Insulation: 1-inch- (25-mm-) thick, fibrous-glass or polystyrene-foam board.

2.05 FLEXIBLE CONNECTORS

DUCT ACCESSORIES

- A. General: Flame-retarded or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.
- B. Standard Metal-Edged Connectors: Factory fabricated with a strip of fabric 3-1/2 inches (89 mm) wide attached to two strips of 2-3/4-inch- (70-mm-) wide, 0.028-inch- (0.7-mm-) thick, galvanized, sheet steel or 0.032-inch (0.8-mm) aluminum sheets. Select metal compatible with connected ducts.
- C. Conventional, Indoor System Flexible Connector Fabric: Glass fabric double coated with polychloroprene.
 - 1. Minimum Weight: 26 oz./sq. yd. (880 g/sq. m).
 - 2. Tensile Strength: 480 lbf/inch (84 N/mm) in the warp, and 360 lbf/inch (63 N/mm) in the filling.
- D. Conventional, Outdoor System Flexible Connector Fabric: Glass fabric double coated with a synthetic-rubber, weatherproof coating resistant to the sun's ultraviolet rays and ozone environment.
 - 1. Minimum Weight: 26 oz./sq. yd. (880 g/sq. m).
 - 2. Tensile Strength: 530 lbf/inch (93 N/mm) in the warp, and 440 lbf/inch (77 N/mm) in the filling.

2.06 FLEXIBLE DUCTS

- A. Insulated duct connectors: UL 181 Class1, 2-ply vinyl film supported by helically wound, spring steel wire, fibrous glass insulation, vapor barrier film.
 - 1. Maximum length shall be 5 feet.
- B. Flexible Duct Clamps: Aluminum band or nylon strap in sizes 3 through 18 inches to suit duct size.

2.07 ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments, and length to suit duct insulation thickness.
- B. Splitter Damper Accessories: Zinc-plated damper blade bracket; 1/4-inch (6-mm), zinc-plated operating rod; and a duct-mounted, ball-joint bracket with flat rubber gasket and square-head set screw.
- C. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 to 18 inches (75 to 450 mm) to suit duct size.
- D. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.01 INSTALLATION

DUCT ACCESSORIES

- A. Install duct accessories according to applicable details shown in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts and NAIMA's "Fibrous Glass Duct Construction Standards" for fibrous-glass ducts.
- B. Install volume dampers in lined duct; avoid damage to and erosion of duct liner.
- C. Provide test holes at fan inlet and outlet and elsewhere as indicated.
- D. Install duct access panels downstream from volume dampers, fire dampers, turning vanes, and equipment.
 - 1. Install duct access panels to allow access to interior of ducts for cleaning, inspecting, adjusting, and maintaining accessories and terminal units.
 - 2. Install access panels on side of duct where adequate clearance is available.
- E. Label access doors according to Division 15 Section 15500 "Mechanical Identification."

3.02 ADJUSTING

- A. Adjust duct accessories for proper settings.
- B. Final positioning of manual-volume dampers is specified in Division 15 Section 15950 "Testing, Adjusting, and Balancing."

3.03 MATERIALS

- A. All materials shall match duct material.

END OF SECTION 15820

SECTION 15838 – POWER VENTILATORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section
- B. Division 15 Section “Vibration and Seismic Control.”

1.02 SUMMARY

- A. This Section includes the following:
 - 1. In-line fans
 - 2. Cabinet fans

1.03 SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated and include the following:
 - 1. Certified fan performance curves with system operating conditions indicated.
 - 2. Certified fan sound-power ratings.
 - 3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
 - 4. Material gages and finishes, including color charts.
 - 5. Dampers, including housings, linkages, and operators.
- B. Maintenance Data: For power ventilators to include in maintenance manuals specified in Division 1.

1.04 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. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.
- C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.
- D. UL Standard: Power ventilators shall comply with UL 705.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fans as factory-assembled unit, to the extent allowable by shipping limitations, with protective crating and covering.

- B. Disassemble and reassemble units, as required for moving to final location, according to manufacturer's written instructions.
- C. Lift and support units with manufacturer's designated lifting or supporting points.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Power Ventilators, utility sets:
 - a. Acme Engineering & Mfg. Corp.
 - b. Cook, Loren Company.
 - c. Greenheck Fan Corp.
 - d. JennFan; Div. of Breidert Air Products, Inc.
 - e. Penn Ventilation Companies, Inc.
 - f. Twin City Fans

2.02 CABINET IN-LINE FANS

- A. Centrifugal direct drive.
- B. Provide vibration isolators per manufacturer's instructions.
- C. 0.5" acoustical insulation on interior.
- D. Manufacturer disconnect.

2.03 IN-LINE CENTRIFUGAL FANS

- A. Manufacturers: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1. Broan Mfg. Co., Inc.
 - 2. Greenheck.
 - 3. JencoFan; Div. of Breidert Air Products.
 - 4. Loren Cook Company.
 - 5. NuTone Inc.
 - 6. Penn Ventilation.
- B. Description: In-line, direct-driven centrifugal fans consisting of housing, wheel, outlet guide vanes, fan shaft, bearings, motor and disconnect switch, drive assembly, mounting brackets, and accessories.
- C. Housing: Split, spun aluminum with aluminum straightening vanes, inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting.
- D. Direct-Driven Units: Motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing.

POWER VENTILATORS

- E. Fan Wheels: Aluminum, airfoil blades welded to aluminum hub.
- F. Motors: ECM suitable for variable speed operation.
- G. Accessories:
 - 1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
 - 2. Volume-Control Damper: Manually operated with quadrant lock, located in fan outlet.
 - 3. Companion Flanges: For inlet and outlet duct connections.
 - 4. Fan Guards: 1/2- by 1-inch mesh of galvanized steel in removable frame. Provide guard for inlet or outlet for units not connected to ductwork.
 - 5. Motor and Drive Cover (Belt Guard): Epoxy-coated steel.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install ventilators level and plumb.
- B. Install units with clearances for service, maintenance, and code compliance..
- C. Label units according to requirements specified in Section 230499.

3.02 CONNECTIONS

- A. Duct installation and connection requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 15 Section "Duct Accessories."
- B. Install ducts adjacent to power ventilators to allow service and maintenance.
- C. Ground equipment.
- D. 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.
- E. Follow SMACNA Guidelines for fan discharge and inlet conditions if not specifically shown.

3.03 ADJUSTING

- A. Adjust damper linkages for proper damper operation.
- B. Lubricate bearings.

3.04 CLEANING

- A. On completion of installation, internally clean fans according to manufacturer's written instructions. Remove foreign material and construction debris.

END OF SECTION 15838

SECTION 15855 – DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes ceiling- and wall-mounted diffusers, registers, and grilles.
- B. Related Sections include the following:
 - 1. Division 15 Section "Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.
 - 2. Division 15 Section "Testing, Adjusting, and Balancing" for balancing diffusers, registers, and grilles.

1.03 DEFINITIONS

- A. Diffuser: Circular, square, or rectangular air distribution outlet, generally located in the ceiling and comprised of deflecting members discharging supply air in various directions and planes and arranged to promote mixing of primary air with secondary room air.
- B. Grille: A louvered or perforated covering for an opening in an air passage, which can be located in a sidewall, ceiling, or floor.
- C. Register: A combination grille and damper assembly over an air opening.

1.04 SUBMITTALS

- A. Product Data: For each model indicated, include the following:
 - 1. Data Sheet: For each type of air outlet and inlet, and accessory furnished; indicate construction, finish, and mounting details.
 - 2. Performance Data: Include throw and drop, static-pressure drop, and noise ratings for each type of air outlet and inlet.
 - 3. Schedule of diffusers, registers, and grilles indicating drawing designation, room location, quantity, model number, size, and accessories furnished.
 - 4. Assembly Drawing: For each type of air outlet and inlet; indicate materials and methods of assembly of components.

1.05 SOURCE QUALITY CONTROL

- A. Testing: Test performance according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 2 - PRODUCTS

2.01 MANUFACTURED UNITS

- A. Diffusers, registers, and grilles are scheduled on Drawings.

DIFFUSERS, REGISTERS AND GRILLES

2.02 AIR INLETS AND OUTLETS

- A. General: Except as otherwise indicated, provide manufacturer's standard units of size, shape, capacity and type indicated; unless otherwise indicated, constructed of aluminum components and as required for complete installation.
- B. Performance: Provide ceiling air diffusers that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device as listed in manufacturer's current data.
- C. Ceiling and Wall Compatibility: Provide inlets and outlets with border styles that are compatible with adjacent ceiling and wall 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 air inlet and outlet.
 - 1. Diffuser Finishes (panel face and slot):
 - a. Drop face or flat face diffusers required to match ceiling tiles. (Verify with architect).
 - b. White enamel or as selected by Architect.
 - 2. Register and Grille Finishes.
 - a. Color by Architect: Semi-gloss enamel finish, special finish colors may be required.
 - b. Filter Return Grilles: Shall include hinged drop front and 1 inch thick permanent frame, replaceable media filters.
 - 3. Bar Grille Finishes:
 - a. Shall be natural anodized.
- D. Manufacturer: Subject to compliance with requirements, provide air inlets and outlets of one of the following:
 - 1. Anemostat
 - 2. Carnes.
 - 3. Titus.
 - 4. Nailor.
 - 5. Price.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb, according to manufacturer's written instructions, Coordination Drawings, original design, and referenced standards.

DIFFUSERS, REGISTERS AND GRILLES

- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of the panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connection to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.03 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

3.04 CLEANING

- A. After installation of diffusers, registers, and grilles, inspect exposed finish. Clean exposed surfaces to remove burrs, dirt, and smudges. Replace diffusers, registers, and grilles that have damaged finishes.

END OF SECTION 15855

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SECTION 15900 – INSTRUMENTATION AND CONTROLS FOR HVAC

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes control equipment for HVAC systems and components, including control components for terminal heating and cooling units not supplied with factory-wired controls, as required for a complete and workable system.
 - 1. All controls and actuation shall be electric or DDC, pneumatics are not allowed.
 - 2. Other SCS buildings have either a Johnson Control Metasys system or the Trane Tracer system. This project shall be compatible with and interface to either of those. See alternate #1.
- B. Hardware and Software
 - 1. Provide the software on a CD that is turned over with the O & M manuals.
 - 2. Provide a login/password-protected method to limit access to the building TC system when directly connecting to the system. Provide unlimited owner access for service purposes.
- C. Related Sections include the following:
 - 1. "Sequences of Operation" is specified on the plans.

1.03 SYSTEM DESCRIPTION

- A. Control system consists of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, and accessories to control mechanical systems.
- B. Control system includes the following:
 - 1. All power wiring required to operate control system not shown on electrical drawings.
 - 2. Transformers, relays, conduits, etc. to ensure a complete and workable system.
 - 3. Field wiring as required by other Div 15 sections.
- C. Hardware Description: Provides PC-based-along DDC control system. The TCC system shall reside on the owner's WAN. Provide all hardware and software needed for connection to the WAN.
- D. TCC shall provide Owner with password protected, encrypted, remote access via web browser. Remote access shall have identical functionality as Wan based system.
- E. All DDC controlled systems shall be viewable through graphical representations. Graphics shall be in a layered format starting with a building floor plan. All DDC controlled mechanical systems shall be represented.

Graphics shall be real time and the operator shall have the ability to make changes in set points, schedules and other variables through the graphics.

1. Provide data connection in the fan room at a location approved by the owner.

F. It is the intention of this specification that all control shall be DDC with the exception of the use of electric thermostats on unit heaters, exhaust fans, etc. as specified. Actuation shall be electric.

1.04 SUBMITTALS

A. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.

1. Each control device labeled with setting or adjustable range of control.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Schematic flow diagrams showing fans, pumps, coils, dampers, valves, and control devices.
2. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
3. Details of control panel faces, including controls, instruments, and labeling.
4. Written description of sequence of operation.
5. Schedule of dampers including size, leakage, and flow characteristics.
6. Schedule of valves including leakage and flow characteristics.
7. Trunk cable schematic showing programmable control unit locations and trunk data conductors.
8. Listing of connected data points, including connected control unit and input device.
9. System graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations.
10. System configuration showing peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.

C. Samples: For each color required, of each type of thermostat cover.

D. Software and Firmware Operational Documentation: Include the following:

1. Software operating and upgrade manuals.
2. Program Software Backup: On a magnetic media or compact disc, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.
5. Software license required by and installed for DDC workstations and control systems.

E. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

F. Maintenance Data: For systems to include in maintenance manuals specified in Division 1. Include the following:

1. Maintenance instructions and lists of spare parts for each type of control device and compressed-air station.
 2. Interconnection wiring diagrams with identified and numbered system components and devices.
 3. Keyboard illustrations and step-by-step procedures indexed for each operator function.
 4. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
 5. Calibration records and list of set points.
- G. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- H. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors. Revise Shop Drawings to reflect actual installation and operating sequences.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is a direct factory branch of the automatic control system manufacturer for both installation and maintenance of units required for this Project.
- B. 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.
- C. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilation Systems."
- D. Comply with ASHRAE 135 for DDC system control components.
- E. Use of subcontractors: The installation may be accomplished by the use of subcontractors. Engineering, programming, checkout and commissioning **must** be accomplished by factory trained and certified personnel in the direct employment of the temperature control manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Factory- Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to unit manufacturer.

1.07 COORDINATION

- A. Coordinate location of thermostats, humidistats, CO2 sensors and other exposed control sensors with plans and room details before installation.
- B. Coordinate equipment with Division 16 to achieve compatibility with equipment that interfaces with that system.
- C. Coordinate supply of conditioned electrical circuits for control units and operator workstation.

- D. Coordinate equipment with Division 16 to achieve compatibility with starter coils and annunciation devices.
- E. Coordinate equipment with Division 16 to achieve compatibility with motor starters and annunciation devices.
- F. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete."

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Control Systems and DDC Components:
 - a. Johnson Controls, contact Ryan Scheidies, 317-917-5069
 - b. Trane Controls, contact Brian Thorne 317-255-8777.
 - c. Substitutions shall be considered under the provisions of the Instructions to Bidders. See alternate #1.

2.02 DDC EQUIPMENT

- A. Application Software: Software installed in this phase shall be maintained as valid and useable, including all updates, through the warranty period Include the following:
 - 1. Input/output capability from operator station.
 - 2. Operator system access levels via software password.
 - 3. Database creation and support.
 - 4. Dynamic color graphic displays (capability only).
 - 5. Alarm processing.
 - 6. Event processing.
 - 7. Automatic restart of field equipment on restoration of power.
 - 8. Data collection.
 - 9. Graphic development on workstation (capability only).
 - 10. Maintenance management.
- B. Control Units: Modular, comprising processor board with programmable, nonvolatile, random-access memory; local operator access and display panel; integral interface equipment; and backup power source.
 - 1. Units monitor or control each input/output point; process information; execute commands from other control units, devices, and operator stations; and download from or upload to operator station.
 - 2. Stand-alone mode control functions operate regardless of network status. Functions include the following:
 - a. Global communications.
 - b. Discrete/digital, analog, and pulse input/output.
 - c. Monitoring, controlling, or addressing data points.
 - d. Testing and developing control algorithms without disrupting field hardware and controlled environment.
 - 3. Local operator interface provides for download from or upload to mobile operator station.

4. All relays to be base mounted in permanent location.
- C. Local Control Units, Application specific controllers: Modular, comprising processor board with electronically programmable, nonvolatile, read-only memory; and backup power source.
1. Units monitor or control each input/output point; process information; and download from or upload to operator station.
 2. Stand-alone mode control functions operate regardless of network status. Functions include the following:
 - a. Global communications.
 - b. Discrete/digital, analog, and pulse input/output.
 - c. Monitoring, controlling, or addressing data points.
 3. Local operator interface provides for download from or upload to mobile operator station.
- D. LANs: Capacity for a multiuser, multitasking environment with concurrent capability to access DDC network or control units.
- E. Software: All software required to operate or to diagnose all aspects of the control system shall be included. Include and implement the following capabilities from the control units:
1. Units of Measure: Inch-pound and SI (metric).
 2. HVAC Control Programs: Optimal run time, supply-air reset, and enthalpy switchover.
 3. Programming Application Features: Include trend point, alarm messages, weekly scheduling, and interlocking.

2.03 CONTROL PANELS

- A. Central (Master) Control Panels: Fully enclosed, steel-rack-type cabinet with locking doors or locking removable backs. Match finish of panels and provide multicolor graphic displays, schematically showing system being controlled.
- B. Local Control Panels: Unitized cabinet with suitable brackets for wall or floor mounting, located adjacent to each system under automatic control. Provide common keying for all panels.
1. Fabricate panels of 0.06-inch- (1.5-mm-) thick, furniture-quality steel, or extruded-aluminum alloy, totally enclosed, with hinged doors and keyed lock and with manufacturer's standard shop-painted finish.
 2. Panel-Mounted Equipment: Temperature and humidity controllers, relays, and automatic switches; except safety devices. Mount devices with adjustments accessible through front of panel.
 3. Door-Mounted Equipment: Flush-mount (on hinged door) manual switches, including damper-positioning switches, changeover switches, thermometers, and gages.

2.04 HVAC CONTROLLERS

- A. HVAC controllers shall provide both standalone and networked direct digital control of HVAC systems.

- B. A dedicated HVAC Controller shall be configured and provided for each primary HVAC system (air handler, chiller, boiler, etc.) and each terminal HVAC system (Unit Ventilator, Fan Coil Unit, etc.).
- C. Each HVAC Controller shall be able to retain program, control algorithms, and setpoint information for at least 72 hours in the event of a power failure, and shall return to normal operation upon restoration of power.
- D. Each HVAC Controller shall report its communication status to the EMS. The EMS shall provide a system advisory upon communication failure and restoration.
- E. For each primary HVAC system, provide means of indication of system performance and setpoints at, or adjacent to the HVAC controller.
- F. For each primary HVAC system, provide a means to adjust setpoints and start/stop equipment at, or adjacent to the HVAC Controller.
- G. Provide a means to prevent unauthorized personnel from accessing setpoint adjustments and equipment control functions.
- H. The HVAC Controller shall provide the ability to modify configuration data via the EMS communications network.

2.05 SENSORS

- A. Electronic Sensors: Vibration and corrosion resistant; for wall, immersion, or duct mounting as required.
 - 1. Thermistor temperature sensors as follows:
 - a. Accuracy: Plus or minus 0.5 deg F (0.3 deg C) at calibration point.
 - b. Wire: Twisted, shielded-pair cable.
 - c. Insertion Elements in Ducts: Single point, 8 inches long; use where not affected by temperature stratification or where ducts are smaller than 9 sq. ft. (1 sq. m).
 - d. Averaging Elements in Ducts: Use where prone to temperature stratification or where ducts are larger than 9 sq. ft. (1 sq. m); length as required.
 - e. Insertion Elements for Liquids: Brass socket with minimum insertion length of 2-1/2 inches (64 mm).
 - f. Room Sensors: Shall be non-adjustable. No push button overrides of the unoccupied cycle.
 - g. Outside-Air Sensors: Watertight inlet fitting, shielded from direct sunlight, mounted on a north facing surface.
 - 2. Resistance Temperature Detectors: Platinum or nickel.
 - a. Accuracy: Plus or minus 0.2 percent at calibration point.
 - b. Wire: Twisted, shielded-pair cable.
 - c. Insertion Elements in Ducts: Single point, 8 inches (20 cm) long; use where not affected by temperature stratification or where ducts are smaller than 9 sq. ft. (1 sq. m).
 - d. Averaging Elements in Ducts: Use where prone to temperature stratification or where ducts are larger than 9 sq. ft. (1 sq. m); length as required.

- e. Insertion Elements for Liquids: Brass socket with minimum insertion length of 2-1/2 inches (64 mm).
 - f. Room Sensors: Match above.
 - g. Outside-Air Sensors: Watertight inlet fitting, shielded from direct sunlight.
 - h. Room Security Sensors: Stainless-steel cover plate with insulated back and security screws.
3. Static-Pressure Transmitter: Non-directional sensor with suitable range for expected input, and temperature compensated.
 - a. Accuracy: 2 percent of full scale with repeatability of 0.5 percent.
 - b. Output: 4 to 20 mA.
 - c. Building Static-Pressure Range: 0 to 0.25 inch wg (0 to 62 Pa).
 - d. Duct Static-Pressure Range: 0 to 5 inches wg (0 to 1243 Pa).
 4. Pressure Transmitters: Direct acting for gas, liquid, or steam service; range suitable for system; proportional output 4 to 20 mA.
- B. Equipment operation sensors as follows:
1. Current sensors shall be equipped with trim pot for zero load calibration.
- C. Status Inputs for Electric Motors: Current-sensing relay with current transformers, adjustable and set to 175 percent of rated motor current.
1. Current sensors shall be equipped with trim pot for zero load calibration.
- D. Current sensing relays shall be field adjustable with a pilot light indicating a contact closed condition.

2.06 THERMOSTATS

- A. Combination Thermostat and Fan Switches: Line-voltage thermostat with two-, three-, or four-position, push-button or lever-operated fan switch.
1. Label switches "FAN ON-OFF," "FAN HIGH-LOW-OFF," "FAN HIGH-MED-LOW-OFF." Provide unit for mounting on two-gang switch box.
- B. Line-Voltage, On-Off Thermostats: Bimetal-actuated, open contact or bellows-actuated, enclosed, snap-switch type, or equivalent solid-state type, with heat anticipator, integral manual on-off-auto selector switch.
1. Equip thermostats, which control electric heating loads directly, with off position on dial wired to break ungrounded conductors.
 2. Dead Band: Maximum 2 deg F (1 deg C).
- C. Remote-Bulb Thermostats: On-off or modulating type, liquid filled to compensate for changes in ambient temperature, with copper capillary and bulb, unless otherwise indicated.
1. Bulbs in water lines with separate wells of same material as bulb.
 2. Bulbs in air ducts with flanges and shields.
 3. Averaging Elements: Copper tubing with either single- or multiple-unit elements, extended to cover full width of duct or unit, adequately supported.
 4. Scale settings and differential settings are clearly visible and adjustable from front of instrument.
 5. On-Off Thermostat: With precision snap switches, with electrical ratings required by application.

6. Modulating Thermostats: Construct so complete potentiometer coil and wiper assembly is removable for inspection or replacement without disturbing calibration of instrument.
- D. Room Thermostat: room thermostats shall be furnished and installed by this section where indicated on the plans. Room thermostats shall be "warmer/cooler" stats, no temperatures shown.
 1. Set-Point Adjustment: Plus or minus 3°F from nominal 72°F set point.(software adjustable)
 2. Set-Point Indication: No.
 3. Timed Override Push Button: Yes
 4. Space Temperature Indication: None.
- E. Room thermostat accessories include the following:
 1. Insulating Bases: For thermostats located on exterior walls or on the fan section of unit ventilators. Thermostat wiring shall have a properly sized grommet or caulking to eliminate air leakage into the back of the stat.
- F. Electric Low-Limit Duct Thermostat: Snap-acting, single-pole, single-throw, manual- or automatic-reset switch that trips if temperature sensed across any 12 inches (300 mm) of bulb length is equal to or below set point.
 1. Bulb Length: Minimum 20 feet (6 m).
 2. Quantity: One thermostat for every 20 sq. ft. (2 sq. m) of coil surface.
- G. Electric High-Limit Duct Thermostat: Snap-acting, single-pole, single-throw, manual- or automatic-reset switch that trips if temperature sensed across any 12 inches (300 mm) of bulb length is equal to or above set point.
 1. Bulb Length: Minimum 20 feet (6 m).
 2. Quantity: One thermostat for every 20 sq. ft. (2 sq. m) of coil surface.

2.07 ACTUATORS

- A. Valve and damper actuation shall be electric. All controls shall be digital.
- B. Electric Motors: Size to operate with sufficient reserve power to provide smooth modulating action or two-position action.
 1. Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.
 2. Nonspring-Return Motors for Valves Larger than NPS 2-1/2 (DN 65): Size for running torque of 150 in. x lbf (16.9 N x m) and breakaway torque of 300 in. x lbf (33.9 N x m).
 3. Spring-Return Motors for Valves Larger than NPS 2-1/2 (DN 65): Size for running and breakaway torque of 150 in. x lbf (16.9 N x m).
 4. Nonspring-Return Motors for Dampers Larger than 25 Sq. Ft. (2.3 sq. m): Size for running torque of 150 in. x lbf (16.9 N x m) and breakaway torque of 300 in. x lbf (33.9 N x m).
 5. Spring-Return Motors for Dampers Larger than 25 Sq. Ft. (2.3 sq. m): Size for running and breakaway torque of 150 in. x lbf (16.9 N x m).

- C. Electronic Actuators: Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque.
1. Valves: Size for torque required for valve close-off at maximum pump differential pressure, 50 psi minimum.
 2. Dampers: Size for running torque calculated as follows:
 - a. Parallel-Blade Damper with Edge Seals: 7 inch-pounds/sq. ft. (86.8 kg-cm/sq. m) of damper.
 - b. Opposed-Blade Damper with Edge Seals: 5 inch-pounds/sq. ft. (62 kg-cm/sq. m) of damper.
 - c. Parallel-Blade Damper without Edge Seals: 4 inch-pounds/sq. ft (49.6 kg-cm/sq. m) of damper.
 - d. Opposed-Blade Damper without Edge Seals: 3 inch-pounds/sq. ft. (37.2 kg-cm/sq. m) of damper.
 - e. Dampers with 2 to 3 Inches wg (500 to 750 Pa) of Pressure Drop or Face Velocities of 1000 to 2500 FPM (5 to 13 m/s): Multiply the minimum full-stroke cycles above by 1.5.
 - f. Dampers with 3 to 4 Inches wg (750 to 1000 Pa) of Pressure Drop or Face Velocities of 2500 to 3000 FPM (13 to 15 m/s): Multiply the minimum full-stroke cycles above by 2.0.
 3. Coupling: V-bolt and V-shaped, toothed cradle.
 4. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
 5. Fail-Safe Operation: Mechanical, spring-return mechanism. Provide external, manual gear release on non-spring-return actuators.
 6. Power Requirements: 24-V ac.
 7. Power Requirements (Modulating): Maximum 10 VA at 24-V ac or 8 W at 24-V dc.
 8. Proportional Signal: 2- to 10-V dc or 4 to 20 mA
 9. Temperature Rating: Minus 22 to plus 122 deg F (minus 30 to plus 50 deg C).
 10. Temperature Rating: Minus 22 to plus 250 deg F (minus 30 to plus 121 deg C).

2.08 CO AND CO2 MONITORING

- A. System shall be equal to Honeywell Analytics (Vulcain) system.
- B. Capable of monitoring multiple CO, CO2 and NOx sensors, quantities as shown.
1. Nominal CO set point is 25 ppm to start exhaust fans, 200 ppm to initiate alarm. Exhaust fans to stop on drop to 9 ppm.
 - a. Audible alarm and strobe light are mounted in service bay, remote alarm shall be connected to district energy management system.
 2. Nominal CO2 set point is 1100 ppm to start exhaust fan; exhaust fan to stop when level goes down to 900 ppm. CO2 above limit shall not initiate alarm.
 3. NOx set point: TBD.
 4. All set point to be software adjustable

2.09 DAMPERS

- A. Dampers: AMCA-rated, opposed-blade design; 0.1084-inch (2.8-mm) minimum, galvanized-steel frames with holes for duct mounting; damper blades shall not be less than 0.0635-inch (1.6-mm) galvanized steel with maximum blade width of 8 inches (203 mm).
1. Blades shall be secured to 1/2-inch- (13-mm-) diameter, zinc-plated axles using zinc-plated hardware, with nylon blade bearings, blade-linkage hardware of zinc-

- plated steel and brass, ends sealed against spring-stainless-steel blade bearings, and thrust bearings at each end of every blade.
2. Operating Temperature Range: From minus 40 to plus 200 deg F (minus 40 to plus 93 deg C).
 3. For standard applications, include optional closed-cell neoprene edging.
 4. For low-leakage applications, use parallel- or opposed-blade design with inflatable seal blade edging, or replaceable rubber seals, rated for leakage at less than 10 cfm per sq. ft. (51 L/s per sq. m) of damper area, at differential pressure of 4 inches wg (995 Pa) when damper is being held by torque of 50 in. x lbf (5.6 N x m); when tested according to AMCA 500D.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that dedicated power supplies are available to control units and operator workstation.

3.02 INSTALLATION

- A. Install software in control units and operator workstation. Implement all features of programs to specified requirements and as appropriate to sequence of operation.
- B. Connect and configure equipment and software to achieve sequence of operation specified.
- C. Verify location of thermostats, humidistats, CO2 sensors and other exposed control sensors with plans and room details before installation. Locate all 60 inches (1524 mm) above the floor.
 1. Install averaging elements in ducts and plenums in crossing or zigzag pattern.
 2. Unless specifically identified otherwise, exposed conduits shall not be allowed in finished spaces.
- D. Install automatic dampers according to Division 15 Section "Duct Accessories."
- E. Install damper motors on outside of duct in warm areas, not in locations exposed to outdoor temperatures.
- F. Install labels and nameplates to identify control components according to Division 15 Section "Common Work Results for Mechanical."
- G. Install labels and nameplates to identify control components according to Division 15 Section "Common Work Results for Mechanical".
- H. Install electronic and fiber-optic cables according to this section.

3.03 ELECTRICAL WIRING AND CONNECTION INSTALLATION

- A. Install raceways, boxes, and cabinets according to Division 16.
- B. Install building wire and cable according to Division 16.
 1. Control cable shall be standard color (green). Contractor to verify exact color with owner.

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2. Control cable shall be run in J-hooks, parallel to walls. Diagonal routing shall not be allowed.
- C. Install signal and communication cable according to Division 16.
1. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.
 2. Install exposed cable in raceway.
 3. Install concealed cable in raceway. Open "plenum rated" cables shall be allowed in concealed accessible areas.
 4. Bundle and harness multiconductor instrument cable in place of single cables where several cables follow a common path.
 5. Fasten flexible conductors, bridging cabinets and doors, along hinge side; protect against abrasion. Tie and support conductors.
 6. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.
 7. All temp control cable shall be purple in color.
- D. Low voltage conductors shall not be run in the same conduit as power wiring or VFD output wiring.
- E. Connect manual-reset limit controls independent of manual-control switch positions. Automatic duct heater resets may be connected in interlock circuit of power controllers.
- F. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position.
- G. Unless specifically noted otherwise, exposed conduits shall be permitted only in mechanical spaces. Conduit in mechanical rooms, boiler rooms, tunnels and other areas exposed to moisture may be rigid or EMT conduit at contractor's option.
- H. Provide isolation strips between class I and class II wiring.

3.04 CONNECTIONS

- A. Ground equipment.
1. 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.

3.05 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections. Report results in writing.
1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove malfunctioning units, replace with new units, and retest.
 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment, and retest.
 3. Calibration test electronic controllers by disconnecting input sensors and stimulating operation with compatible signal generator.
- B. Replace damaged or malfunctioning controls and equipment.

1. Start, test, and adjust control systems.
2. Demonstrate compliance with requirements, including calibration and testing, and control sequences.
3. Adjust, calibrate, and fine tune circuits and equipment to achieve sequence of operation specified.
4. Complete installation and proper check out of the control system shall include all necessary debugging and calibration as well as demonstration of all the features of the system to the Engineer.

C. Verify DDC as follows:

1. Verify software including automatic restart, control sequences, scheduling, reset controls, and occupied/unoccupied cycles.
2. Verify operation of operator workstation.
3. Verify local control units including self-diagnostics.

3.06 DEMONSTRATION & TRAINING

- A. Provide minimum of 2 hours of training for CO/CO2/NOx monitoring system, to be scheduled at the owner's discretion within one year of substantial completion

3.07 POINTS LIST

- A. The following equipment shall be stand-alone, with controls by unit manufacturer, terminal unit wiring shall be by installing contractor or Div 16. No connection to this section is required.

1. RTU-1 and -2.
2. Gas unit heaters
3. Ceiling fans

- B. As a minimum, the system shall be able to display, adjust, alarm, and control the following:

1. MUA Air handlers:

- a. Status
- b. Schedule: occupied/unoccupied
- c. Safeties: Smoke detectors, temperature low limits, pressure high limit.
- d. Outdoor air damper position.
- e. Return air damper position
- f. Room Temp and set point
- g. LAT
- h. Space static pressure, Metals Lab only

2. Exhaust and Relief Fans (EF-13 and -14):

- a. Status.
- b. Schedule: occupied/unoccupied.
- c. Damper position. (Rm. 101 make-up louvers).
- d. Room temperature where shown as control point (Rm. 105 & 107)

3. Rm. 101 air monitoring, see para. 2.09

END OF SECTION 15900

SECTION 15950 – TESTING, ADJUSTING AND BALANCING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes testing, adjusting, and balancing HVAC systems to produce design objectives, including the following:
 - 1. Balancing airflow within distribution systems, including submains, branches, and terminals, to indicated quantities according to specified tolerances.
 - 2. Evaluate the acceptability of the duct leakage results with the applicable ASHRAE standards.
 - 3. Adjusting total HVAC systems to provide indicated quantities.
 - 4. Reporting results of the activities and procedures specified in this Section.
 - 5. Labor and material for changing of fan sheaves as required for system balance for system balance shall be included as the work of this section.
- B. Related Sections include the following:
 - 1. Testing and adjusting requirements unique to particular systems and equipment are included in the Sections that specify those systems and equipment.

1.03 SUBMITTALS

- A. Certified Testing, Adjusting, and Balancing Reports: Submit 2 copies of reports prepared, as specified in this Section, on approved forms certified by the testing, adjusting, and balancing Agent.
- B. Warranty: Submit 2 copies of special warranty specified in the "Warranty" Article below.

1.04 PREPARATION AND COORDINATION – GENERAL

- A. Shop drawings, submittal data, up-to-date revisions, change orders and other data required for planning, preparation and execution of the TAB work shall be provided to the TAB Agency no later than 30 days prior to start of TAB work.
- B. System installation and equipment startup shall be complete prior to the TAB Agency being notified to begin.
- C. The building control system shall be complete and operational. The HVAC Instrumentation and Controls contractor shall install all necessary computers and computer programs, and make these operational. Assistance shall be provided as required for reprogramming, coordination and problem resolution.

- D. All test points, balancing devices, identification tags, etc. shall be accessible and clear of insulation and other obstructions that would impede TAB procedures.
- E. Qualified installation or startup personnel shall readily available for operation and adjustment of the systems. Assistance shall be provided as required for coordination and problem resolution.

1.05 QUALITY ASSURANCE

- A. AABC or NEBB certified contractors.
- B. Certification of Testing, Adjusting, and Balancing Reports: Certify the testing, adjusting, and balancing field data reports. This certification includes the following:
 - 1. Review field data reports to validate accuracy of data and to prepare certified testing, adjusting, and balancing reports.
 - 2. Certify that the testing, adjusting, and balancing team complied with the approved testing, adjusting, and balancing plan and the procedures specified and referenced in this Specification.
- C. Testing, Adjusting, and Balancing Reports: Use standard forms from NEBB or AABC's "Standards for Testing, Adjusting, and Balancing."
- D. Instrumentation Type, Quantity, and Accuracy: As described in AABC national standards.
- E. Instrumentation Type, Quantity, and Accuracy: As described in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," Section II, "Required Instrumentation for NEBB Certification."
- F. Instrumentation Calibration: Calibrate instruments at least every 6 months or more frequently if required by the instrument manufacturer.

1.06 PROJECT CONDITIONS

- A. Partial Owner Occupancy: The Owner may occupy completed areas of the building before Substantial Completion. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with the Owner's operations.

1.07 COORDINATION

- A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist testing, adjusting, and balancing activities.
- B. Notice: Provide 7 days' advance notice for each test. Include scheduled test dates and times.
- C. Perform testing, adjusting, and balancing after leakage and pressure tests on air distribution systems have been satisfactorily completed.
- D. Review start-up data/test sheet for the following:
 - 1. Duct leak testing.
 - 2. Factory start-ups.

TESTING, ADJUSTING, AND BALANCING

3. Control check out data sheets.
4. Division 16, written notice of nameplate, heater verification.

1.08 WARRANTY

- A. General Warranty: The national project performance guarantee 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. National Project Performance Guarantee: Provide a guarantee on AABC'S or NEBB's "National Standards" forms stating that AABC or NEBB will assist in completing the requirements of the Contract Documents if the testing, adjusting, and balancing Agent fails to comply with the Contract Documents. Guarantee includes the following provisions:
 1. The certified Agent has tested and balanced systems according to the Contract Documents.
 2. Systems are balanced to optimum performance capabilities within design and installation limits.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine Contract Documents to become familiar with project requirements and to discover conditions in systems' designs that may preclude proper testing, adjusting, and balancing of systems and equipment.
 1. Contract Documents are defined in the General and Supplementary Conditions of the Contract.
 2. Verify that balancing devices, such as flow-control devices and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- B. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Specification Sections have been performed.
- C. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports and manual volume dampers, are properly installed, and their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- D. Examine HVAC equipment to ensure clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

3.02 GENERAL TESTING AND BALANCING PROCEDURES

TESTING, ADJUSTING, AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC national standards and this Section.
- B. Cut insulation, ducts, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to the insulation Specifications for this Project.
- C. Mark equipment settings with paint or other suitable, permanent identification material, including damper-control positions, valve indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

3.03 FUNDAMENTAL AIR SYSTEMS' BALANCING PROCEDURES

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. Determine the best locations in main and branch ducts for accurate duct airflow measurements.
- D. Check the airflow patterns from the outside-air louvers and dampers and the return- and exhaust-air dampers, through the supply-fan discharge and mixing dampers.
- E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- F. Verify that motor starters are equipped with properly sized thermal protection.
- G. Check dampers for proper position to achieve desired airflow path.
- H. Check for airflow blockages.
- I. Check condensate drains for proper connections and functioning.
- J. Check for proper sealing of air-handling unit components.
- K. Check for proper sealing of air duct systems.

3.04 TOLERANCES

- A. Set HVAC system airflow rates within the following tolerances:
 - 1. Supply, Return, and Exhaust Fans: 0 to plus 10 percent.
 - 2. Air Outlets and Inlets: 0 to minus 10 percent.

3.05 FINAL REPORT

- A. General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in 3-ring binder, tabulated and divided into sections by tested and balanced systems.

- B. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.
 - 1. Include a list of the instruments used for procedures, along with proof of calibration.

- C. Final Report Contents: In addition to the certified field report data, include the following:
 - 1. Fan curves.
 - 2. Manufacturers' test data.
 - 3. Field test reports prepared by system and equipment installers.
 - 4. Other information relative to equipment performance, but do not include approved Shop Drawings and Product Data.

- D. General Report Data: In addition to the form titles and entries, include the following data in the final report, as applicable:
 - 1. Title page.
 - 2. Name and address of testing, adjusting, and balancing Agent.
 - 3. Project name.
 - 4. Project location.
 - 5. Architect's name and address.
 - 6. Engineer's name and address.
 - 7. Contractor's name and address.
 - 8. Report date.
 - 9. Signature of testing, adjusting, and balancing Agent who certifies the report.
 - 10. Summary of contents, including the following:
 - a. Design versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.

 - 11. Nomenclature sheets for each item of equipment.
 - 12. Data for terminal units, including manufacturer, type size, and fittings.
 - 13. Notes to explain why certain final data in the body of reports vary from design values.
 - 14. Test conditions for fans and pump performance forms, including the following:
 - a. Settings for outside-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Fan drive settings, including settings and percentage of maximum pitch diameter.
 - e. Settings for supply-air, static-pressure controller.
 - f. Other system operating conditions that affect performance.

- E. System Diagrams: Include schematic layouts of air distribution systems. Present with single-line diagrams and include the following:
 - 1. Quantities of outside, supply, return, and exhaust airflows.
 - 2. Duct, outlet, and inlet sizes.
 - 3. Balancing stations.
 - 4. Position of balancing devices.

3.06 ADDITIONAL TESTS

TESTING, ADJUSTING, AND BALANCING

- A. Within 90 days of completing testing, adjusting, and balancing, perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial testing, adjusting, and balancing procedures were not performed during near-peak summer and winter conditions, perform additional inspections, testing, and adjusting during near-peak summer and winter conditions.

END OF SECTION 15950

SECTION 16010 - SUMMARY OF ELECTRICAL WORK

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish and install a complete electrical system, as specified and shown on drawings.
- B. Provide all items, articles, materials, operations or methods listed, mentioned or scheduled on the drawings and/or herein, including all labor, materials, equipment and incidentals necessary and required for their completion.
- C. All work shall be installed as per drawings, specifications and electrical code. Where one contradicts the other the greater shall be used.
- D. Coordination required for submittals of electrical and lighting utility incentives and rebates.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. The General Provisions of the Contract, including General and Supplementary Conditions and Division 1, apply to all sections of work specified in this Division 16.

PART 2 - PRODUCTS

2.01 GENERAL

- A. All materials shall be new and bear the manufacturer's name, trade name and UL label in every case where a standard has been established for the particular material. The materials to be furnished under each section of the specifications shall be the manufacturer's latest approved design.
- B. Materials shall be delivered to the site and stored in original containers and be readily accessible for inspection by the Architect/Engineer until installed.
- C. Materials of the same general type shall be of the same make throughout the project to provide a uniform appearance, operation and maintenance.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All work performed under this section must be done by workmen skilled in their respective trades. All work must present an appearance typical of the best trade practices. Any work not installed in this manner shall be repaired, removed and replaced or otherwise remedied as directed by the Architect/Engineer.
- B. Manufacturer's direction shall be followed completely in the delivery, storage, protection and installation of all equipment and materials. The Contractor shall promptly notify the Architect/Engineer, in writing, of any conflict between any requirement of the Contract Documents and the manufacturer's directions or such written instructions from the Architect/Engineer, before proceeding with the work.

- C. All work and equipment installed under Division 16 work shall be supported, plumbed, rigid and true to line. All Architectural, Structural, Mechanical, Electrical and Fire Protection drawings, shop drawings and catalog data, shall be studied thoroughly, to determine how equipment, fixtures and conduit, etc., are to be supported, mounted or suspended, and shall provide extra steel bolts, inserts, brackets and accessories for proper support whether or not show on the drawings. When directed, drawings shall be submitted showing supports for approval.

3.02 MISCELLANEOUS STEEL

- A. Provide all necessary miscellaneous steel angles, channels, rods, etc., for hanging, mounting or suspending equipment, fixtures, devices, etc., installed under Division 16 work.
- B. Supports installed under Division 16 work shall be suitably fastened to building structural members in a manner approved by Architect/Engineer

3.03 SPECIAL SEALS

- A. After conduits and tubing are installed, the spaces around conduits shall be sealed.
- B. Sealing of all spaces created for the electrical systems shall be in accordance with the requirements of the fire inspector and governing codes.

3.04 UTILITY INCENTIVES AND REBATES

- A. Coordinate materials to and through the Architect as required by utility companies for submission of incentives and rebates.
- B. Provide all paperwork as requested by the Architect for this purpose on behalf of the Owner.
 - 1. Product submittals and cutsheets of all installed materials and items.
 - 2. Invoices including information such as; make/model, quantities, unit prices, total costs, etc.
 - 3. Contractor shall sign all required forms as necessary for completion of the submission.
 - 4. Submittal will be coordinated through and submitted by the Architect on behalf of the Owner.
- C. Contractor may be required to coordinate timing for ordering of materials and products to correspond to time requirements by the utility granting incentive or rebate. Some products may require granting of the incentive and rebate prior to ordering of materials. This may result in ordering of materials in multiple packages and at differing times for multiple deliveries. Contractor is to coordinate these requirements as communicated by the Architect.
- D. Payment of all incentives and rebates will be made to the Owner, not the Contractor.

END OF SECTION 16010

SECTION 16015 - ELECTRICAL COORDINATION

PART 1 - GENERAL

1.01 COORDINATION

- A. The Contractor is responsible for the proper coordination of the work specified herein.
- B. Any apparatus, appliance, material or work not shown on the drawings, but mentioned in the specifications or vice versa, or any incidental accessories necessary to make the work complete in all respects and ready for operation, even if not particularly specified, shall be furnished, delivered and installed under Division 16 work.
- C. Minor adjustments in location of conduit, boxes, and/or equipment shall be made at no additional charge if so directed prior to their installation. Where offsets in conduits, additional fittings, necessary junction boxes, pull boxes, devices, etc., are required to complete the installation, to clear obstructions or the work of other trades, or for the proper operation of the system, these shall be deemed to be included in the Contract and shall be furnished and installed complete under Division 16 work.
- D. The Contractor shall exchange complete original and revised drawings, details, information, etc., such that all installations are properly coordinated and fit together into a complete and acceptable project.
- E. Where Division 16 work will be installed in proximity to other work or where there is evidence that the Division 16 work will interfere with other work the contractor shall assist in working out space conditions to make a satisfactory adjustment. If so directed by Architect/Engineer, the contractor shall prepare composite working drawings and sections at a suitable scale not less than 1/4 inch - 1'-0", clearly showing how work is to be installed in relation to other work. If Division 16 work is installed before coordinating with other work, or so to cause interferences with other work, the contractor shall make necessary changes in the work to correct the condition.
- F. The contractor shall arrange for all chases in walls, slots in beams, openings in floor or roof, etc., required for the installation of pipes, ducts, conduits, etc., and be held responsible for the proper location of chases required for the work. The contractor shall further be responsible for having work that is required to be built in, on hand in time for proper progress.
- G. The contractor shall make all measurements in the field and shall be responsible for correct fittings. The contractor shall coordinate this work with all other divisions in such a manner as to cause a minimum of conflict or delay. Division 16 work shall be coordinated in advance with other work and report immediately any difficulty which can be anticipated before installing work in question.
- H. The contractor shall coordinate with other work for proper location of roughing-in an connection to equipment.
- I. Refer to Architectural, Structural, Mechanical Drawings and Specifications for construction features, floor and ceiling elevations, finishes, grade elevations, work in other divisions, size and location of pipe chases and head room for same, location of walls, partitions, beams, etc., swing of doors, switches and electrical outlets and the order and time of placement of all work. No work to proceed until all details affecting or affected by these conditions have been completely developed and properly resolved.

1.02 VISIT THE PREMISES

- A. The contractor is directed to visit the premises and become thoroughly familiar with the general layout of the building site and the location of the present utility lines to which connection will be made before submitting a proposal.
- B. The contractor shall also check present grades, ditches, pavements, sewers and/or any other conditions affecting the installation of electrical ducts and utilities under the Contract.
- C. Offsets which may be required to leave new work clear, etc., will be included in the proposal, and the contractor assumes full responsibility for having made a proper and thorough investigation of these requirements.
- D. The Contract is based upon the assumption that the contractor has investigated, understands and accepts all existing conditions.
- E. While all existing storm sewers, sanitary sewers, water mains, gas mains, power lines, telephone lines and other utility services, and/or installations, both underground and overhead, may not have been indicated on the drawings, the contractor will be held expressly responsible for determining the exact location of all such service lines and/or installations encountered in the performance of the Contract and for the provision of suitable protection, support and maintenance.

1.03 SPACE REQUIREMENT

- A. It shall be the responsibility of the contractor to insure that items to be furnished fit the space available, with proper provisions for access to equipment for maintenance and replacement. The contractor shall make necessary field measurements to ascertain space requirements, including those for connections, and removal of parts, and shall furnish and install such sizes and shapes of equipment that the final installation shall suit the true intent and meaning of the drawings and specifications.
- B. All installations shall be made to maintain maximum headroom and clearance around equipment. When space and/or headroom appear inadequate, Contractor shall notify Architect/Engineer prior to proceeding with the installation.
- C. All equipment which must be serviced, operated or maintained shall be located in fully accessible positions. Minor deviations from the contract drawings may be made to allow for better accessibility, but changes of magnitude or which involve extra cost shall not be made without prior approval.
- D. The contractor is responsible to determine that the equipment and appliances which are furnished can be brought into the building. No extra compensation will be allowed for dismantling of equipment to install in the available space or to obtain entrance into the building.
- E. Where equipment that has been approved requires different arrangement or connections from those shown, it shall be the responsibility of the contractor to install the equipment to operate properly and in harmony with the intent of the drawings and specifications. When directed by the Architect/Engineer, the contractor shall submit drawings showing the proposed installation. If the proposed installation is approved, the contractor shall make all incidental changes in conduits, supports, wiring, heaters, panelboards, etc.
- F. The contractor shall provide any additional devices, fittings, and other additional equipment required for the proper operation of the system resulting from the selection of equipment, including all required changes in affected trades. The contractor shall be responsible for the proper location of roughing in and connections by other trades.

1.04 MATERIAL STORAGE

- A. All materials shall be stored in a manner that does not interfere with the progress of work. All items shall be stored in dry spaces.

- B. Materials stored within buildings as approved by the Architect/Engineer shall be distributed in such a manner as to avoid overloading of the structural frame, and never shall be concentrated in such a manner as to exceed the equivalent of fifty (50) pounds per square foot uniformly distributed loading.

END OF SECTION 16015

SECTION 16021 - CONCRETE WORK AND ACCESS PANELS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide all access doors and panels for any and all concealed devices installed under Division 16.
- B. Access doors shall be provided for, but not be limited to junction boxes, pull boxes, etc., in otherwise inaccessible locations.
- C. Provide concrete equipment bases under all electrical equipment mounted on ground, installed under Division 16, unless otherwise indicated.
- D. Provide a minimum of 3 inch concrete encasement for underground main service feeder conduits except where conduits are run under floor slab. Maintain minimum of 3 inches between conduits where several conduits occur in the same trench.
- E. Provide concrete bases for ground-mounted area lighting units.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 03300 - Cast-In-Place Concrete
Section 08305 - Access Doors.

PART 2 - PRODUCTS

2.01 EQUIPMENT

- A. Access panels shall be of sufficient size for the service intended or required or as indicated on the drawings.
- B. Minimum size shall be 12 inches x 12 inches.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Items installed above acoustical lay-in tile ceilings shall not require access doors.
- B. Provide wood boxes or frames for access panels located in plaster or ceramic tile walls. Boxes shall have proper anchoring devices and shall be installed after tile or plaster work has been completed.
- C. Housekeeping Pads:
 - 1. Provide concrete housekeeping bases under all electrical and mechanical equipment mounted on the floor or ground, installed under Division 15 or 16.
 - 2. Establish sizes and location of the various concrete bases required and provide all necessary anchor bolts together with templates for holding these bolts in position.
 - 3. Each concrete base shall be no less than 4 inches high and project 3 inches on all sides beyond the equipment.

END OF SECTION 16021

SECTION 16025 - CODES, FEES AND STANDARDS

PART 1 - GENERAL

1.01 CODES AND FEES

- A. Unless specifically notes to the contrary, the Contractor shall furnish all equipment materials, labor and install and test in accordance with applicable sections of latest revisions published at date of bid of the following:
1. American Concrete Institute (ACI).
 2. American National Standards Institute (ANSI).
 3. American Society for Testing and Materials (ASTM).
 4. American Institute of Steel Construction (AISC).
 5. Aluminum Association (AA).
 6. National Board of Fire Underwriters (NBFU).
 7. Underwriters Laboratories Inc. (UL).
 8. American Iron and Steel Institutes (AISI).
 9. Institute of Electrical and Electronics Engineers (IEEE).
 10. National Electrical Manufacturers Association (NEMA).
 11. Insulated Cable Engineers Association (ICEA).
 12. National Electrical Safety Code (NESC).
 13. Edison Electric Institute (EEI).
 14. National Electric Code (NEC).
 15. Illuminating Engineering Society (IES).
 16. National Bureau of Standards (NBS).
 17. American Welding Society (AWS).
 18. Association of Edison Illumination Companies (AEIC).
 19. Uniform Building Code (UBC).
 20. American Association of State Highway and Transportation Officials (AASHTO).
 21. Environmental Protection Agency (EPA).
 22. Occupational Safety and Health Act (OSHA).
 23. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).
 24. Lighting Protection Institute (LPI) Standard of Practice.
 25. Life Safety Code (LSC).
 26. Local State Fire Marshall's Office (SFM).
 27. National Fire Protection Association (NFPA).
- B. The provisions, rules, regulations and ordinances listed above are to be considered as much a part of these specifications as if repeated herein or attached hereto. All changes or modifications required to conform to such codes, regulations or requirements must be approved by the Architect/Engineer.
- C. The Contractor shall comply with applicable laws, building and construction codes and applicable regulations of governing local, County, State and other applicable codes, including the Utility company. Obtain permits and inspections from authorities having jurisdiction, and pay required charges. Deliver certificates of inspection to the Architect at time of acceptance inspection.

1.02 STANDARDS

- A. All materials shall be new, free of defects and shall be U.L. listed, bear the U.L. Label or be labeled or listed with and approved, nationally recognized Electrical Testing Agency. Where no labeling or listing service is available for certain types of equipment, test data shall be submitted to prove to the Engineer that equipment meets or exceeds available standards.

1.03 UTILITY COMPANY FEES, CHARGES, COSTS

- A. It is the contractor's responsibility to contact the appropriate Electric and Telephone Utility Companies to determine if any fees, charges or costs will be due to the Utility Company, as required by the Utility Company for temporary power, In/Out installations, hook-ups, surveying of easements, etc. This fee, charge or cost shall be included in the contractor's bid price.

END OF SECTION 16025

SECTION 16050 - BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The other Contract Documents complement the requirements of this Section. The General Requirements apply to the work of this Section.
- B. Section 01510 - Temporary Utilities
- C. Section 01520 - Temporary Construction
- D. Section 01740 - Cleaning

1.02 SCOPE

- A. The work shall include the furnishings of systems as defined in Section 16010 "Work Included".
- B. Drawings for the work are diagrammatic, intended to convey the Scope of the Work and to indicate the general arrangement and locations of the work. Because of the scale of the drawings, certain basic items such as conduit fittings, access panels, sleeves, pull and junction boxes may not be shown. Where such items are required by Code or by other sections, such items shall be included.
- C. Equipment Specification may not deal individually with minute items such as components, parts, controls and devices which may be required to produce the equipment performance specified or as required to meet the equipment warranties. Where such items are required, they shall be included by the supplier of the equipment, whether or not specifically indicated.
- D. Coordinate with all trades in submittal of shop drawings. Shop drawings shall detail space conditions to the satisfaction of all concerned trades, subject to review and final acceptance by the Architect. In the event that the Contractor installs work before coordinating with other trades or so as to cause any interference with work of other trades, the necessary changes shall be made in the work to correct the condition, at no additional cost to the Owner.

1.03 TEMPORARY POWER AND LIGHTING

- A. Furnish, install and maintain temporary power with ground fault protection and lighting to be used by all trades during construction. See Section 16025 for In/Out fees. The entire system shall be grounded. Payment for monthly current consumption shall be the responsibility of the Contractor. Thermal magnetic breakers or cartridges fuses only shall be used for over current protection.

1.04 SUPERVISION OF THE WORK

- A. Provide field superintendent who has had a minimum of four (4) years previous successful experience on projects of comparable sizes and complexity. Superintendent shall be present at all times that work under this Division is being installed or affected. Superintendent shall be a licensed Journeyman.

1.05 ELECTRICAL CONNECTIONS

- A. All connections shall be tightened to the torque values recommended by that device manufacturers instructions. If these values are not listed, tighten to pound-inch or pound-foot values recommended in UL Standard 486B, a summary of which may be found in the National Electric Code Handbook.

1.06 ACTIVE SERVICES

- A. Existing active services; water, gas, sewer, cable, fiber electric, when encountered, shall be protected against damage. Do not prevent or disturb operation of active services which are to remain. If active services are encountered which require relocation, make request to authorities with jurisdiction or determination of procedures. Where existing services are to be abandoned, they shall be terminated in conformance with requirements of the utility or Municipality having jurisdiction.

1.07 TESTS

- A. Systems shall be tested by the Contractor and placed in proper working order prior to demonstrating systems to Owner.
- B. After work is completed, a load balance test shall be made for each panelboard to demonstrate that with full lighting and mechanical load, the balance between phases is within 10%. Unbalanced beyond this limit shall be corrected, maintaining proper phase relation to neutral at all times. Submit to Engineer, prior to request for final inspection, a written report of existing and final load information.

1.08 DEMONSTRATIONS

- A. Prior to acceptance of the work, the Contractor shall demonstrate to the Owner, or his designated representative, all features and functions of all systems and shall instruct the Owner in the proper operation of the systems. Each system shall be demonstrated once.
- B. The demonstration shall consist of not less than the following:
1. Point out the actual location of each component of a system and demonstrate its function and its relationship to other components within the system.
 2. Demonstrate the electrical system by actual "start-stop" operation showing how to work controls, how to reset protective devices, how to replace fuses, and what to do in an emergency.
 3. Demonstrate communication, signal, alarm and detection systems by actual operation of the systems and show how to reset signal, alarm and detection devices.
- C. Systems to be demonstrated shall include but not be limited to the following:
1. Service and power distribution systems.
 2. Lighting and lighting control systems.
 3. Emergency lighting systems.
 4. Motor and equipment control.
 5. Fire alarm system.
 6. Intercom and paging system.
 7. Program bell system.
 8. Security system.
 9. HVAC time control system.
- D. Contractor shall furnish the necessary trained personnel to perform the demonstrations and instructions, and if necessary shall arrange to have the manufacturer's representatives present to assist with the demonstrations. The Contractor shall allow one (1) day for performing prescribed demonstrations.
- E. The Contractor shall arrange with the Owner the dates and times for performing each demonstrations.

1.09 IDENTIFICATION

- A. The Contractor shall provide identification for wiring systems and equipment.

- B. Lettering for identification of fire alarm, telephone, TV, security, P.A. etc., shall be of sign painters quality or stencil lettering. Paint shall be fast drying sign enamel. All major pull and junction boxes for these systems except fire alarm in service areas, tunnels, above accessible ceilings and in accessible chases shall have one-half inch high black lettering identifying the system. Fire alarm shall have red lettering. Example: Fire Alarm = FA, Security = SCTY, Telephone = TEL.
- C. Power and lighting circuits shall have conductors color banded, per 16120 Wire and Cable in each junction and pull box.
- D. Nameplates:
 - 1. The following, but not limited to, items shall be equipped with nameplates: All motor starters, push-button stations, control panels, time switches, disconnect switches, panel boards, contractors or relays in separate enclosures, power receptacles where the nominal voltage between any pair or contracts is greater than 150V, all switches controlling outlets or equipment where the outlets are not located within sight of the controlling switch, high voltage boxes and cabinets. Special electrical systems shall be identified at terminal cabinets and equipment racks.
 - 2. Power panels, motor control centers and switchgear without doors, shall have circuit breakers and switches identified by engraved plastic tags affixed to cabinet adjacent to device.
 - 3. Nameplates shall adequately describe the function of the particular equipment involved. Where nameplates are detailed on the drawings, inscription and size of letters shall be as shown on the shop drawings submitted for approval. Nameplates for panelboards, motor control centers and switchboards shall include the panel designation, voltage and phase of the supply. For example, "Panel PA, 120/208V, 3-phase, 4-wire". The name of the machine on the nameplates for a particular machine shall be the same as the one used on all motor starters, disconnect and P.B. station nameplates for that machine.
 - 4. Nameplates shall be laminated phenolic plastic, black front and back with white core, with lettering etched through the outer covering. Attach with plated self-tapping screws or small brass screws in un-air conditioned spaces. Namplates to identify emergency devices shall be red laminate.
- E. Panelboards shall have type-written circuit directories installed inside the doors under transparent plastic covers.

1.10 SUBMITTALS

- A. Method of preparing and procedure for submitting Shop Drawings and submittal data shall be in compliance with the general section of these specifications.
- B. Submittal data for electrical equipment shall consist of Shop Drawings and/or catalog cuts showing technical data necessary to evaluate the material or equipment, to include dimensions, wiring diagrams, performance curves, ratings, control sequence and other descriptive data necessary to describe fully the item proposed and its operating characteristics. Any submittal data in following electrical sections, peculiar to that section, is in addition to submittal requirements of this section.

1.11 EXCAVATING, TRENCHING AND BACKFILLING

- A. The contractor shall do excavating necessary for underground wiring, conduit and shall backfill trenches and excavations with sand after work has been inspected. Care shall be taken in excavating that walls and footings and adjacent load bearing soils are not disturbed in any way, except where lines must cross under a wall footing. Where a line must pass under a footing, the crossing shall be made by the smallest possible trench to accommodate the conduit. Excavation shall be kept free from water by pumping if necessary. No greater length of trench shall be left open, in advance of conduit laying, than that which is required.

- B. Roots shall be removed to a minimum level of eighteen (18) inches below finish grade. No roots shall be allowed to remain under any installed electrical work.
- C. Backfill about the structures shall be placed, when practical, as the work of construction progresses. Backfilling on or against concrete work shall be done only when directed. Backfilling of duct lines shall progress as rapidly as the testing and acceptance of the finished sections of the work will permit and shall be carried to a crown approximately six (6) inches above the existing grades. In backfilling around duct lines, selected material shall be compacted firmly around and to a depth of not less than six (6) inches over the top of the duct. Fill and backfill and rough gradings shall be compacted thoroughly in layers and shall be brought up to within six (6) inches of finished grades. Fill and backfill shall be clean and free from vegetable matter and refuse.

1.12 CUTTING AND PATCHING

- A. Cut existing walls, floors, ceilings, roofs, etc. necessary for the proper installation of new materials, equipment and related electrical items. Provide all necessary framing, lintels, hangers, etc. to maintain the structural integrity of the building system after cutting.
- B. Contractor is responsible for cost to restore or patch adjacent surfaces to original condition. Employ proper professional trade for patching and finishing exposed surfaces.

END OF SECTION 16050

SECTION 16111 - CONDUIT SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The other Contract Documents complement the requirements of this section. The General Requirements apply to the work of this Section.

1.02 SCOPE

- A. Furnish materials, tools, labor and supervision necessary to fabricate and install a complete electrical conduit system.
- B. Conduit systems shall be provided for all wiring systems, except where the Drawings or other Sections of the Specifications indicate that certain wiring may be installed without conduit.

1.03 STANDARDS AND CODES

- A. Methods of fabrication and installation shall copy with the provisions of all applicable Sections of the NEC.
- B. Materials shall be UL and NEC approved for the application intended.

1.04 DESCRIPTION

- A. This section describes the basic materials and methods of installation for conduit systems.

1.05 QUALIFICATIONS

- A. The materials used in the fabrication of the conduit system shall be products of a manufacturer regularly engaged in the manufacturing of the specified material. Where a manufacturer is named for a particular material, the material of other manufacturers shall be acceptable provided the materials meets requirements of the Specification.

PART 2 - PRODUCTS

2.01 CONDUIT

- A. Rigid Conduit: Full weight, threaded, rigid steel conduit, galvanized inside and out by hot dip or electrogalvanizing process. Additional protection by electrostatically applied baked coating. Thread protective caps and couplings shall remain in place prior to use. Rigid conduit to be used for exposed exterior installations, where subject to physical abuse and required by Code.
- B. Electrical Metallic Tubing (EMT): Thinwall, electrically welded cold rolled steel conduit, galvanized inside and out by electrogalvanized process. Use for conduit installed in stud walls, masonry walls, above suspended ceilings and were exposed in interior spaces not subject to physical abuse.
- C. Flexible Metal Conduit: Formed at one continuous length of spirally wound electrogalvanized steel strip. Use for final connections to any equipment subject to movement or vibration. Connections to fixtures shall be limited to 6 feet in length. All other connections shall be a maximum of 1'-6" in length.
- D. Liquidtight Flexible Metal Conduit: Formed of one continuous length of spirally wound steel strip, with water and oil tight neoprene jacket. Use for final connections to equipment listed in paragraph C above when located in wet or damp areas.

- E. PVC Conduit:
Conduit shall be sunlight resistant, schedule 40, 90°C. Conduit shall be composed of polyvinyl chloride and shall conform to NEMA Standards. Conduit, fittings and cement shall be produced by the same manufacturer. May be used where buried outside building, encased in concrete, or below slabs on grade. Electrical non-metallic tubing and rigid non-metallic conduit shall not be used below grade within the building. PVC conduit shall be installed in concealed location only.
- F. Electrical non-metallic tubing and rigid non-metallic conduit shall not be used within the building.

2.02 CONDUIT FITTINGS

- A. Rigid Conduit Fittings:
Threaded, galvanized malleable iron or heavy steel, water and concrete tight.
Grounding type nylon insulated bushings for connectors at cabinets, boxes and gutters.
- B. Metallic Tubing Fittings:
Set screw type steel, except in wet or concrete tight applications. For wet or concrete tight applications, use compression type galvanized steel. Use connectors with nylon insulated throats at cabinets, boxes and gutters. Indenter type and malleable iron fittings will not be allowed.
- C. Flexible Metal Conduit Fittings:
Squeeze or screw type galvanized steel with nylon insulated throats.
- D. Liquidtight Flexible Conduit Fittings:
Galvanized steel, with watertight gaskets, O-ring and retainer, and nylon insulated throats.
- E. Conduit Fittings:
Exposed conduit fittings shall be Condulet type for sharp turns, tees, etc.

2.03 OUTLET BOXES

- A. Material, size and installation for outlet boxes shall comply with NEC. Article 370.
- B. Boxes shall be Raco, Steel City, Appleton or equivalent.
In general, the type of boxes shall be as follows:
 - 1. In stud walls; For single outlet use 4 inches square by 2-1/8 inches deep box. For ganged outlets use 4-1/2 inches high by 1-5/8 inches deep multiple gang boxes. Boxes to be provide with raised covers of depth as required for thickness of wall materials.
 - 2. In masonry and poured concrete walls; For single outlets requiring two conduit connections in top and/or bottom of box use 4 inches square by 2-1/8 inches deep box with raised square cut cover. For ganged outlets use 3-3/4 inches high by 2-1/2 inches deep multiple gang masonry box.
 - 3. Surface-mounted wall outlets; For single outlet use 2-1/8 inches deep handy box, for double outlets use 4 inches square by 2-1/8 inches deep box. For more than two ganged outlets use 3-3/4 inches x 2-1/2 inches deep multiple gang masonry boxes. Boxes to be provided with 1/2 inch raised cover as required for device.
 - 4. In suspended ceilings; Use 3-1/2 inches deep octagon box with fixture studs and steel mounting bars.
 - 5. Surface outlets installed outdoors or in wet locations; Use Type FS or FD box with weatherproof cover plates for receptacles and switches.

2.04 PULL AND JUNCTION BOXES

- A. Construction, sizes and installation of pull and junction boxes shall comply with NEC, Article 370 and tables 270-6 (a) and (b).
- B. Pull and junction boxes not specifically described in NEC, Article 370, shall be fabricated of heavy gauge galvanized steel with screw covers and enamel finish.
- C. Pull and junction boxes for installation in poured concrete floors shall be flush type, cast iron, with watertight gasketed covers. Boxes for installation in floors with tile or carpet floor covering shall have recessed brass covers and brass carpet flanges to accommodate the floor covering.
- D. Pull and junction boxes for outdoor installations shall be raintight.

2.05 AUXILIARY GUTTERS

- A. Construction, sizes and installation of auxiliary gutters shall comply with NEC, Article 374.

2.06 HANGERS AND SUPPORTS

- A. Provide conduit hanger and support devices of approved type for method of supporting required, to include: structural steel members, suspension rods, conduit clamps, concrete inserts, expansion shields, beam clamps and welding pins. All devices shall have galvanized finish or other approved corrosion resistance finish. All supporting devices shall be manufactured for the purpose. Hangar wire and similar supports shall not be used. In general, hangers and supports shall be as follows:
 - 1. Where single or multiple run of conduit is routed on surface of structure; use conduit clamps mounted on Unistrut channel so as to maintain not less than 1 inch clearance between conduit and structure.
 - 2. Where single run of conduit is suspended from overhead; use split ring conduit clamp suspended by steel drop rod not less than 3/8 inch diameter.
 - 3. Where multiple parallel runs of conduit are suspended from overhead; use split ring conduit clamps uniformly spaced and supported on trapeze hangers fabricated of Unistrut channels, suspended by not less than 1/2 inch steel drop rod.
 - 4. Where conduit is routed in steel stud partitions, use metal stud clips, style as appropriate for application, equivalent to "Caddy" brand.
 - 5. Maximum hanger and support spacing shall be in accordance with NEC. Regardless of listed spacing, provide additional hangers or supports at not more than 2'-0" from each change of direction and at each side of any box or fitting.
- B. Hangers and supports shall be anchored to structure as follows:
 - 1. Hangers and supports anchored to poured concrete; use malleable iron or steel concrete inserts attached to concrete forms.
 - 2. Hangers or supports anchored to structural steel; use beam clamps and/or steel channels as required by structural system.
 - 3. Hangers or supports anchored to metal deck; use spring clips or approved welding pins. Maximum permissible load on each hanger shall not exceed 50 pound.
 - 4. The use of explosive force hammer actuated, booster assist or similar anchoring device will not be permitted.

2.07 SURFACE RACEWAYS (DUAL SERVICE - POWER AND DATA):

- A. Basis of Specification: "Legrand"; Wiremold 2300D Series.
- B. Description:
 - 1. Small capacity, 2-1/4" x 11/16" overall dimension.
 - 2. 2-compartment to separate power from data/low voltage cabling.
 - 3. Non-metallic, PVC surface raceway.
 - 4. Over-the-raceway mount boxes for all components and devices.
 - 5. Corners to have a 2" bend radius in compliance with TIA/EIA 569-A.
 - 6. Provide type of devices, jacks and faceplates as appropriate for all services required.
 - 7. Provide all horizontals, verticals, corners, trims, covers, clips, brackets, caps, plates, fittings, etc. as required for a complete and finished installation.
- C. Finish: White.

2.08 SURFACE RACEWAYS (SINGLE SERVICE - POWER OR DATA):

- A. Basis of Specification: "Legrand"; Wiremold 2300 Series.
- B. Description:
 - 1. Small capacity, 2-1/4" x 11/16" overall dimension.
 - 2. 1-compartment for single type service cabling.
 - 3. Non-metallic, PVC surface raceway.
 - 4. Over-the-raceway mount boxes for all components and devices.
 - 5. Corners to have a 2" bend radius in compliance with TIA/EIA 569-A.
 - 6. Provide type of devices, jacks and faceplates as appropriate for all services required.
 - 7. Provide all horizontals, verticals, corners, trims, covers, clips, brackets, caps, plates, fittings, etc. as required for a complete and finished installation.
- C. Finish: White.

PART 3 - EXECUTION

3.01 CONDUIT INSTALLATION

- A. In general, horizontal runs of conduit shall be installed in ceiling spaces. Conduit for convenience outlets, wall-mounted fixtures and other wall outlets shall be routed overhead and dropped through block cells or stud walls to the outlet.
- B. **Conduit shall not be installed in or below concrete floor slabs except where noted on drawings or required to serve open floor area outlets or equipment.**
- C. Generally, conduit shall be concealed, except in shafts, mechanical equipment rooms, and at connections to surface boxes and free standing equipment, and as otherwise noted.
- D. All conduit shall be routed in lines parallel to building lines.
- E. No conduit shall be installed closer than 6 inches to piping installed by other trades.
- F. Minimum size conduit shall be 1/2 inch trade size. Where specific size is not called for on Drawings or in specification, Contractor shall select size required from Chapter 9 of NEC. Where specific sizes required by Drawings or Specifications are larger than Code requires, the larger size shall be installed.

- G. Install the conduit system mechanically and electrically, continuous from outlet and to cabinets, junction or pull boxes, Conduit shall enter and be secured to cabinets and boxes in such a manner that all parts of the system will have electrical continuity.
- H. Install insulated ground wire in all raceways. Size per NEC 250.

3.02 OUTLET BOX INSTALLATION

- A. Outlet boxes shall be installed for, but not limited to, fixtures, switches, receptacles and other devices.
- B. Approximate location of outlets are shown on the plans, but each location as shown shall be checked by the Contractor before installing the outlet box.
- C. Wall boxes installed flush in common wall shall generally not be back-to-back or through-wall types. Where it is necessary to install boxes back-to-back, install sound absorption material between boxes and plug nipple connection with duct seal.
- D. Boxes located on opposite sides of a common wall that are closely connected by conduit shall have the conduit openings plugged with duct seal.
- E. Outlet boxes shall be installed plumb and square with wall face and with front of box or cover located within 1/8 inch of face of finish wall. Boxes in masonry shall be set with bottom or top of box tight to the masonry unit, unless otherwise specified.

3.03 PULL AND JUNCTION BOX AND GUTTER INSTALLATION

- A. Install pull boxes, junction boxes and auxiliary wiring gutters where required by Code and where required to facilitate installation of the wiring. In longer conduit runs, install a pull box for at least each 100 feet of conduit.
- B. For concealed conduit, install boxes flush with ceiling or wall, with covers accessible and easily removable. Where flush boxes are installed in finished ceilings or walls, provide cover which shall exceed the box face dimensions by a sufficient amount to allow no gap between box and finished material.
- C. Boxes shall not be located in finished, occupied rooms, without prior approval of Architect/Engineer.

3.04 HANGER SUPPORT INSTALLATION

- A. Hangers and supports shall be installed for all conduit and boxes. Supports shall be manufactured for the purpose.
- B. Conduit and boxes shall not be attached to or supported from mechanical pipes, plumbing pipes or sheet metal ducts.
- C. Tie wire shall not be used.
- D. Work includes support frames for conduit runs to equipment.

END OF SECTION 16111

SECTION 16120 - WIRE AND CABLE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The other Contract Documents complement the requirements of this Section. The General Conditions apply to the work of this Section.

1.02 SCOPE

- A. Furnish materials, tools, labor and supervision necessary to install wiring systems.

1.03 STANDARDS AND CODES

- A. Methods of installation shall comply with the provisions of applicable Sections of NEC, Article 300.
- B. Materials shall be in accordance with NEC, Article 310 and shall be UL listed for application intended.

1.04 DESCRIPTION

- A. This Section describes the basic materials and methods of installation for general wiring systems of 600 volts and less. Wiring for a higher voltage rating, if required, shall be specified in another Section or as required.
- B. Minimum size conductors shall be No. 12 AWG for power circuits, No. 14 AWG for control wiring and 20 AWG shielded for communication and sensor wiring.

1.05 QUALIFICATIONS

- A. The material used for the wiring systems shall be the products of a manufacturer regularly engaged in the manufacturing of the specified material. Where a manufacturer is named for a particular material, the materials of other manufacturers will be acceptable provided the material meets requirement of the specifications.

PART 2 - PRODUCTS

2.01 WIRE AND CABLE

- A. Wire and cable for power, control and signal circuits shall have copper conductors of not less than 98% conductivity and shall be insulated to 600V except as noted below. Power conductor sizes No. 10 and 12 AWG shall be solid or stranded. Aluminum wire is not permitted.
- B. Type of wire and cable for the various application shall be as follows:
1. Type THW, THWN or XHHW (75°C): Use for branch circuits, and equipment power feeders in wet and dry locations, No. 12 AWG minimum.
 2. Type RHH, THHN or XHHW (90°C): Use for branch circuits, and equipment power feeders in dry locations only, No. 12 AWG minimum.

2.02 CONDUCTOR COLOR CODING

- A. Wiring systems shall be color coded. Conductor insulation shall be colored in sizes up through No. 8 AWG, conductors No. 6 AWG and larger shall have black insulation and shall be phase color coded with one-half inch band of colored tape at all junctions and terminations. Colors shall be assigned to each conductor as described below and carried throughout all main and branch circuit distribution.

<u>CONDUCTOR</u>	<u>120/208 Volt</u>
1. Phase 'A' conductor	Black
2. Phase 'B' conductor	Red
3. Phase 'C' conductor	Blue
4. Neutral conductor	White
5. Grounding conductor	Green

2.03 CONNECTORS - POWER WIRING

- A. In-line splices and taps for conductor sizes No. 8 AWG and smaller; use 3M Co. Scotchloc vinyl insulated spring connectors, or equivalent.
- B. Insulate splices and taps to thickness of conductor insulation with half-lapped of 3M Scotch brand No. 33 vinyl electrical tape. Connectors having irregular surfaces; fill voids and smooth contours with 3M Scotchfil electrical putty prior to tapping.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Wire shall not be installed in the conduit system until the building is enclosed and wet work completed.
- B. Conduit shall be swabbed free of moisture and debris prior to pulling in wire.

3.02 INSTALLATION

- A. Splices in branch circuit wires shall be made only in accessible junction boxes.
- B. Power cable shall be pulled with the use of approved pulling compound for long runs.

END OF SECTION 16120

SECTION 16164 - BRANCH CIRCUIT PANELBOARDS - CIRCUIT BREAKER TYPE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The other Contract Documents complement the requirements of this Section. The General Requirements apply to the work of the Section.

1.02 SCOPE

- A. Furnish equipment, materials, tools, labor and supervision necessary to install Branch Circuit Panelboards.

1.03 STANDARDS AND CODES

- A. Fabrication and installation shall comply with applicable Section of NEC, Article 384, and shall bear UL label.

1.04 DESCRIPTION

- A. Panelboards described in this Section shall be deadfront, safety type furnished with thermal-magnetic molded case circuit breakers. Shall be for lighting, receptacle and appliance branch circuit application. Circuit breakers shall have frame and trip ratings as shown on the Drawings.

1.05 QUALIFICATIONS

- A. Panelboards by Eaton, Square D, Westinghouse, General Electric or Siemens/ITE.

1.06 SUBMITTALS

- A. Shop drawings to include fabrication details, lug and bus arrangement, ampere and voltage rating, breaker frame sizes and interrupting ratings.

PART 2 - PRODUCTS

2.01 PANELBOARDS

- A. Bussing Assembly and Temperature Rise:
1. Panelboard bus structure and main lugs or main breaker shall have current ratings as shown on the panelboard schedule. Such ratings shall be established by heat rise tests with maximum hot spot temperature on any connector to bus bar not to exceed 50°C rise above ambient. Heat rise test shall be conducted in accordance with Underwriter's Laboratories Standard UL67. The use of conductor dimensions will not be accepted in lieu of actual heat tests.
 2. Bus bar connections to the branch circuit breakers shall be the "distributed phase" or "phase sequence" type.
 3. Single-phase, three-wire panelboard bussing shall be such that any two adjacent single-pole breakers can be installed in any location.
 4. Three-phase, four-wire bussing shall be such that any three adjacent single-pole breakers are individually connected to each of the three different phases in such a manner that two of the three-pole breakers can be installed at any location.
 5. Current-carrying parts of the bus assembly shall be plated. Mains ratings shall be as shown in the panelboard scheduled on the plans.
 6. Equipment ground bus shall be provided for all panels.
 7. All bussing and Panelboards shall be copper.
- B. Safety Barriers:
1. The panelboard interior assembly shall be dead front with panelboard front removed.

- C. Cabinets and Fronts:
1. Panelboard assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be as specified in UL Standard 50 for cabinets. Wiring gutters shall be in accordance with UL Standard 67 for panelboards. Minimum gutter 6 inches each side, 5 inches top and bottom.
 2. Fronts shall include doors and have flush, brushed stainless steel, cylinder tumbler-type locks with catches and spring-loaded door pulls. The flush lock shall not protrude beyond the front of the door. All panelboard locks shall be keyed alike.
 3. Front shall have adjustable indicating trim clamps which shall be completely concealed when the doors are closed. Doors shall be mounted by completely concealed steel hinges. Fronts shall not be removable with door in the locked position.
 4. A circuit directory frame and card with a clear plastic covering shall be provided on the inside of the door. The directory card shall provide a space of at least 1/4 inch high x 3 inches long or equivalent for each circuit. The directory shall be typed to identify the load fed by each circuit.
 5. Fronts shall be of code gauge, full finished steel with rust-inhibiting primer and baked enamel finish.
 6. Provide surface or flush fronts as needed.
- D. Wiring Terminals:
1. Terminals for feeder conductors to the panelboard mains and neutral shall be UL listed as suitable for the type of conductor specified.
 2. Terminals for branch circuit wiring, both breaker and neutral, shall be UL listed as suitable for the type of conductor specified.
- E. Circuit Breakers:
1. Quick-make, quick-break, thermal-magnetic, trip indicating, and have common trip on all multiple breakers.
 2. Bolt-on type equipped with individually insulated, braced and protected connectors. The front faces of circuit breakers shall be flush with each other.
 3. Large permanent individual circuit numbers shall be affixed to each breaker in a uniform position (or equip each breaker with a circuit card holder and neatly printed card identifying with circuit).
 4. Tripped indication shall be clearly shown by the breaker handle taking a position between ON and OFF.
 5. Provisions for additional breakers shall be such that no additional connectors will be required to add breakers.
 6. At contractors option: Provide multipole circuit breakers where neutral sharing is allowed. All ungrounded circuits sharing neutral conductor shall have multipole breakers whether shown or not.
- F. Special Breakers:
1. Ground Fault Interrupting (GFI), with test button.
 2. Shunt Trip, with solenoid plunger to activate the mechanical trip release when activated by low voltage control.

- G. Integrated Equipment Rating:
1. Each panelboard, as complete unit, shall have a rating equal to or greater than the integrated equipment rating shown on the panelboard schedule. Such rating shall be established by test with the circuit breakers mounted on the panelboard. The short-circuit tests on the circuit breaker shall be made simultaneously by connecting the fault to each panelboard breaker with the panelboard connected to its rated voltage source. Method of testing shall be per proposed UL standards pertaining to listing of molded case circuit breakers for high-interrupting capacity ratings. The source shall be capable of supplying the specified panelboard short-circuit current or greater. Test data showing the completion of such tests upon the entire range of distribution and power panelboards to be furnished shall be submitted to the Architect, if requested, with or before the submittal of approval drawings. Testing of panelboard circuit breakers for short-circuit rating only with a breaker individually mounted is not acceptable. Also testing of the bus structure by applying a fixed fault to the bus structure alone is not acceptable.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Secure anchor panelboards to structure and make feeder and branch circuit connections as required. Provide unistrut as required to mount panel to structure.
- B. Provide GFI breakers for circuit in lieu of individual 120v outlet GFI devices
- C. Provide Shunt Trip breakers as required by state or local codes serving all cooking equipment located under kitchen cookline exhaust hood. Connect external control to the Ansul fire protection system at the cookline hood for automatic de-energizing of all power to equipment.

END OF SECTION 16164

SECTION 16170 - DISCONNECT SWITCHES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The other Contract Documents complement the requirement of this Section. The General Requirements apply to the work of this Section.

1.02 SCOPE

- A. In general, disconnect switches are indicated on the Drawings, and it shall be the Contractor's responsibility to furnish and install all disconnect switches, whether indicated or not, for equipment and motors furnished.
- B. Disconnect switches shall be fused unless otherwise noted. Fuse per nameplate.

1.03 STANDARDS AND CODES

- A. Except where otherwise required by this Section, the following Standards and Codes shall govern:
 - 1. NEC Article 380
 - 2. UL listed
 - 3. NEMA KSI - 1969

1.04 QUALIFICATIONS

- A. Disconnect switches by Eaton, Square D, Siemens/ITE, General Electric or Cutler-Hammer.

PART 2 - PRODUCTS

2.01 EQUIPMENT

- A. Disconnects for fractional horsepower motors, 1/2-horsepower and smaller, and less than 125 volts, and for equipment of similar capacity and voltage shall be supplied integral with the equipment or shall be a standard snap switch horsepower rated.
- B. Disconnects for fractional horsepower motors larger than 1/2-horsepower and for integral horsepower motors, and for equipment of similar capacity shall be general duty industrial type, with solid neutrals when required.

END OF SECTION 16170

SECTION 16199 - WIRING DEVICES AND PLATES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The other Contract Documents complement the requirement of this Section. The General Requirements apply to the work of this Section.
- B. See Section 16950-Occupancy Sensors for wall switch sensors.

1.02 SCOPE

- A. Provide materials, equipment, labor and supervision necessary to install Wiring Devices.

1.03 STANDARDS AND CODES

- A. Except where otherwise required by this Section, the following Standards and Codes shall govern:
 - 1. Receptacles; NEC Article 410K
 - 2. Wall Switches; NEC Article 380
 - 3. UL listed
 - 4. NEMA Standards

1.04 QUALIFICATIONS

- A. Provide products, as approved by the Architect, from one of the following manufacturers:
 - 1. "Hubbell".
 - 2. "General Electric".
 - 3. "Legrand/Pass & Seymour".
 - 4. "Lutron".
 - 5. "Leviton".
 - 6. "Arrow Hart".

PART 2 - PRODUCTS

2.01 GENERAL

- A. All wiring devices shall be "Specification Grade" except where higher grade is called for.

2.02 SWITCHES

- A. Switches shall be:
 - 1. Single Pole Toggle Light Switch - 20 amp, 120-277 volt, "Hubbell" No. 1221, "Hubbell" No. 1221-L for lock type.
 - 2. Double Pole Toggle Light Switch - 20 amp, 120-277 volt, "Hubbell" No. 1222, "Hubbell" No. 1222- L for lock type.
 - 3. Three-Way Toggle Light Switch - 20 amp, 120-277 volt, "Hubbell" No. 1223, "Hubbell" No. 1223- L for lock type.
 - 4. Four-Way Toggle Light Switch - 20 amp, 120-277 volt, "Hubbell" No. 1224, "Hubbell" No. 1224-L for lock type.
 - 5. Momentary Contact Switch - 15 amp, 120-277 volt, "Hubbell" No. 1556, "Hubbell" No. 1556-L for lock type.
 - 6. Pilot Light Press Switch - 20 amp, 120-277 volt, Single Pole "Hubbell" No. 1297-I, Double Pole "Hubbell" No. NY 1514-I, Three-Way "Hubbell" No. 1298-I.
 - 7. Color: Grey

2.03 DIMMER SWITCHES

- A. Dimmer switches shall be:
1. Dimmer switch and ballast controller appropriate for specific lamping type being controlled; fluorescent, LED, incandescent, etc.
 2. Slide type dimming control. No rotary or toggle type controls permitted.
 3. Separate On/Off preset push or rocker switch permits turning lights on and off without disturbing the dimming light level setting. Switch shall return light to preset dimming level.
 4. Device to fit standard single gang or multi-gang switch boxes.
 5. Dual rated for 120/277 volt.
 6. Shall be approved by the lighting manufacturer for use in conjunction with specified lighting fixtures and dimming ballasts.
 7. Color: Grey

2.04 RECEPTACLES

- A. Receptacles shall be:
1. Duplex Receptacle - 2 pole, 3 wire grounding type, back and side wired, 20 amp, 125 volt, "Hubbell" No. 5362.
 2. Receptacles for power and special purpose outlets shall have characteristics and NEMA configurations as per Electrical Symbols list. Supply as needed.
 3. Color: Grey

2.05 COVER PLATES

- A. Stainless Steel.
- B. Provide plates for all switches, receptacles, and outlets throughout the entire project. Provide blank plates for all unused outlets.
- C. Plates for outlets in unfinished spaces shall be of the handy box type.

2.06 EXTERIOR RECEPTACLE COVERS

- A. Provide weatherproof "While-In-Use" covers for all exterior receptacles per NEC, Section 406.8(B)(1) for Outdoor Wet Location covers, equal to "Legrand/Pass&Seymour" WIU Series.
- B. Color to be selected from manufacturer's entire selection.

2.07 GROUND FAULT INTERRUPTING RECEPTACLES (GFI)

- A. Ground fault interrupting receptacles shall be duplex feed through type with test and reset buttons, equal to "Legrand/Pass&Seymour" No. 1591F.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Wiring devices shall be installed and located as follows, unless noted otherwise on the Drawings:
1. Switches: 44 inches above finished floors.
 2. Receptacles: 16 inches above finished floors typically; 44 inches above finished floors or 8 inches above countertops; 48 inches above finished floors in shops, mechanical rooms, utility rooms, service spaces, and similar areas where required by the NEC.
 3. Dimensions are to bottom of outlet box.
- B. In masonry walls, switches and receptacle heights shall be adjusted as required so outlets are at nearest mortar joint to specified height.

- C. Where light switches are located adjacent to doors, they shall be installed on knob side of door, unless indicated otherwise.
- D. Where walls have wainscot finish, switch height shall be adjusted as required, so switch is either all in wainscot or all in wall above wainscot.
- E. Prior to roughing-in outlet boxes, Contractor shall verify from general construction drawings; door swings, type of wall finishes and locations for counters and work benches.

END OF SECTION 16199

SECTION 16450 - GROUNDING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The other Contract Documents complement the requirements of this Section. The General Conditions apply to the work of this Section.

1.02 SCOPE

- A. This section deals with the grounding of service equipment, transformers, non-current carrying conductive surfaces of equipment, metal buildings, structures and other equipment.

1.03 STANDARDS AND CODES

- A. All grounding connections shall be installed in accordance with the National Electrical Code and applicable local code requirements. Such codes shall be considered minimum requirements and the installation of the grounding system shall insure freedom from dangerous shock exposure and shall provide a low impedance ground fault path to permit operation of overcurrent and ground fault protective devices.
1. NEC Article 250
 2. National Electrical Safety Code.

1.04 QUALIFICATIONS

- A. Use Thomas and Betts compression ground system, exothermic welds or an approved listed compression type system.

PART 2 - PRODUCTS

2.01 CONDUCTORS

- A. All grounding conductors whether insulated or not shall be copper.

2.02 GROUND RODS

- A. All ground rods shall be copper clad steel, 3/4 inch by 10 feet solid type.

2.03 GROUND CONNECTIONS

- A. The connection of a grounding conductor to ground rods or ground conductor to ground conductor shall be by means of Thomas & Betts compression ground system, or exothermic weld.
- B. Ground connections to building steel or equipment shall be bolted using T & B compression type lugs.
- C. Slab penetrations of ground conductors shall terminate on T & B compression type flush plate connectors installed flush in slab. Interior connections of flush plate connectors shall be made using compression lugs.
- D. Grounding conductor connections at conduit terminations shall be made by approved listed grounding bushings.

PART 3 - EXECUTION

3.01 MAIN SERVICE GROUND

- A. In accordance with NEC Article 250-81, each of the following shall be bonded together to form the grounding electrode system:
1. Metal underground water pipe in direct contact with the earth for 10 feet or more (provide jumpers around water meter).
 2. Metal frame of the building where effectively grounded.
 3. Concrete-encased electrode consisting of a minimum of 20 feet of No. 3/0 AWG bare copper in the footing.
 4. Counterpoise (Ground Ring) for lightning protection system (if lightning protection is installed).
- B. This grounding system shall be supplemented by three copper clad steel ground rods 3/4 inches in diameter by 10 feet long. The ground rods shall be driven a distance of 10 feet apart.
- C. The grounding electrode system shall be connected to the grounded circuit conductor (neutral) on the supply side of the service disconnecting means by a grounding electrode conductor. The grounding electrode conductor will be sized as shown in Table 250-94 of the National Electrical Code.

3.02 FEEDER AND BRANCH CIRCUITS

- A. All feeders and branch circuits shall have installed in the same raceway as the circuit conductors, an insulated copper grounding conductor sized in accordance with Table 250-95 of the National Electrical Code unless such a grounding conductor is shown to be larger on the plans or specified to be larger elsewhere in the specifications.

3.03 EXPOSED NON-CURRENT CARRYING CONDUCTIVE SURFACES

- A. All exposed non-current carrying conductive surfaces of electrical equipment shall be grounded to the equipment conductor run with the circuit conductors or a separate ground as shown on the drawings.

END OF SECTION 16450

SECTION 16470 - DISTRIBUTION PANELBOARD - CIRCUIT BREAKER TYPE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The other Contract Documents complement the requirements of this Section. The General Requirements apply to the work of this section.

1.02 SCOPE

- A. Provide equipment, materials, tools, labor and supervision necessary to install Distribution Panelboards.

1.03 STANDARDS AND CODES

- A. Fabrication and installation shall comply with applicable Sections of NEC, Article 284, and shall bear UL label.

1.04 DESCRIPTION

- A. Panelboards described in this Section shall be deadfront, safety type furnished with thermal magnetic, molded case circuit breakers. Shall be for power distribution application and when required shall be suitable for service equipment. Circuit breakers shall have frame and trip ratings as scheduled on Drawings.

1.05 QUALIFICATIONS

- A. Panelboards by Eaton, Square D, Westinghouse, General Electric or Siemens/ITE.

1.06 SUBMITTALS

- A. Shop drawings to include fabrication details, lug and bus arrangement, ampere and voltage rating, breaker frame sizes and interrupting ratings.

PART 2 - PRODUCTS

2.01 PANELBOARDS

- A. Bussing Assembly and Temperature Rise:
1. Panelboard bus structure and main lugs or main breaker shall have current ratings as shown on the panelboard schedule. Such ratings shall be established by heat rise test with maximum hot spot temperature on any connector or bus bar not to exceed 50°C rise above ambient. Heat rise tests shall be conducted in accordance with Underwriters Laboratories Standard UL67. The use of conductor dimensions will not be accepted in lieu of actual heat tests.
 2. Equipment ground bus shall be provided for all panels.
- B. Safety Barriers:
1. The panelboards interior assembly shall be deadfront with panelboard front removed.
- C. Cabinet:
1. Panelboard assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be as specified in UL Standard 50 for cabinets. The size of wiring gutters shall be in accordance with UL Standard 67.
 2. Cabinets to be equipped with spring latch and tumbler-lock on door of trim. Doors over 48 inches long shall be equipped with three-point latch and vault lock. All locks shall be keyed alike. Endwalls shall be removable.
 3. Fronts shall be of code gauge, full-finished steel with rust-inhibiting primer and baked enamel finish.

- D. Circuit Breakers:
1. Equipped with individually insulated, braced and protected connectors. The front faces of all circuit breakers shall be flush with each other.
 2. Large, permanent, individual circuit numbers shall be affixed to each breaker in a uniform position (or equip each breaker with a circuit card holder and neatly printed card identifying the circuit).
 3. Tripped indication shall be clearly shown by the breaker handle taking a position between ON and OFF.
 4. Provisions for additional breakers shall be such that no additional connectors or hardware will be required to add breakers.
- E. Integrated Equipment Rating:
1. Each panelboard, as a complete unit, shall have a rating equal to or greater than the integrated equipment rating shown on the panelboard schedule. Such rating shall be established by test with the circuit breakers mounted on the panelboard. The short-circuit tests on the circuit breaker and on the panelboard structure shall be made simultaneously by connecting the fault to each panelboard breaker with the panelboard connected to its rated voltage source. Method of testing shall be per proposed UL standards pertaining to listing of molded case circuit breakers for high-interrupting capacity ratings. The source shall be capable of supplying the specified panelboard short-circuit current or greater. Test data showing the completion of such tests upon the entire range of distribution and power panelboards to be furnished shall be submitted to the Architect, if requested, with or before the submittal or approved drawings. Testing of panelboard circuit breakers for short-circuit rating only with the breaker individually mounted is not acceptable. Also, testing of the bus structure by applying a fixed fault to the bus structure is not acceptable.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Securely anchor panelboards to structure to make feeder connection as indicated and as required.

END OF SECTION 16470

SECTION 16471 - FEEDER AND BRANCH CIRCUITS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The other Contract Documents complement the requirements of this Section. The General Conditions apply to the work of this Section.

1.02 SCOPE

- A. Provide materials, equipment, labor and supervision necessary to install feeder and branch circuits to include, but not limited to:
1. Conductors
 2. Conduit fittings and boxes
 3. Overcurrent protection
 4. Panelboards
 5. Conduit hangers and supports
 6. Wiring devices
 7. Motor and equipment connections

1.03 STANDARDS AND CODES

- A. Except where otherwise required by this Section, the following Standards and Codes shall govern:
1. Branch circuits; NEC Articles 210 and 220
 2. Feeders; NEC Articles 215 and 220
 3. Motor circuits; NEC Article 430
 4. Grounding; NEC Article 250

PART 2 - PRODUCTS

2.01 FEEDER CIRCUITS

- A. A riser diagram and general layout of feeder circuits are indicated on the drawings. The Contractor shall lay out the feeders generally as indicated, but shall determine the exact layout and routing of feeders so as to best fit the layout of the work.
- B. Conductor sizes for feeder circuits are noted on the drawings or panel schedules.

2.02 BRANCH CIRCUITS

- A. A general layout of branch circuit wiring is indicated on the drawings. Receptacles and appliances shall be on separate circuit from lighting.
- B. Branch panel circuits are numbered to match NEMA pole numbering system; poles 1 and 2 - Phase A, poles 3 and 4 - Phase B, poles 5 and 6 - Phase C, etc.
- C. No. 14 wire will be permitted only on control circuits of relays, contractors, starters, etc. No. 12 wire will be minimum size for any lighting, motor or general branch circuits unless specifically noted otherwise.
- D. Conductor sizes for major branch circuits, such as large motor and equipment branch circuits, are noted on the drawings.
- E. Conductor sizes for lighting, receptacles and small motor branch circuits, with less than 20 ampere connected load, are not shown on drawings. Conductors for such circuits shall be sized as follows:

1. Conductor size for branch circuits 100 feet in length from branch circuit panel to center of load shall not be smaller than No. 12; over 100 feet not smaller than No. 10.
 2. Conductor size for exit light circuits shall not be smaller than No. 10.
- F. Where specific conductor sizes required by the drawings are larger than Code required, the larger sizes shall be installed.
- G. Circuits may be arranged in 4-wire feed, 3 circuits and common neutral, in color code previously described, more than 3 circuits in conduit is not permitted.

END OF SECTION 16471

SECTION 16500 - LIGHTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The other Contract Documents complement the requirements of this Section. The General Requirements apply to the work of this Section.

1.02 SCOPE

- A. Provide lighting fixtures, accessories, labor, and supervision necessary to install a complete Lighting System.

1.03 STANDARDS AND CODES

- A. Except where otherwise required by this Section, the following Standards and Codes shall govern:
 - 1. NEC Article 410.
 - 2. UL listed.

1.04 SUBMITTALS

- A. Submit catalog cuts giving complete description of fixtures to include photometric curves and method of installation.

1.05 QUALIFICATION

- A. The lighting fixtures listed in the fixture schedule are the basis for design. Includes both aesthetic and performance requirements.
- B. Requests for approval for substitutions must be submitted per Section 01630, complete with all supporting data and product information.
- C. Final review for fixtures will be when shop drawings are submitted. The Architect reserves the right to reject and fixtures which, in his opinion, do not meet the overall lighting system design. Upon request, the fixture supplier shall submit sample fixtures.

PART 2 - PRODUCTS

2.01 FIXTURES

- A. Provide fixtures as indicated on drawings.
- B. Recessed fixtures in soffits and solid surface ceilings shall be furnished with trim kits and supports compatible with construction.
- C. See Electrical Drawings and Lighting Fixture Schedule for additional requirements of all fixtures.

2.02 LED FIXTURES

- A. LED Lamps shall have system life rated to retain a minimum of 70% light output at 50,000 hours of use (L70 at 50,000 hours).
- B. LED lamp color temperatures shall be rated at CRI > 80.
- C. If lumens are indicated on fixture schedule, it is the minimum delivered lumens of output required.
- D. If fixture watts are indicated on fixture schedule, it is the maximum nominal input wattage permitted.

- E. Provide adapters as required for depths of construction at each location and condition.
Provide correct trim and mounting as required for each location and condition.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install fixtures; coordinate exact location with Architect's Drawings.
- B. Fixtures shall be grounded.
Lamp sockets shall be wired so that the outer shell is connected to the neutral grounded conductor.
- C. Recessed fixtures in removable ceilings shall be connected to the branch circuit with flexible conduit and branch circuit wire from an accessible junction box. Fluorescent fixtures shall not be used for branch circuits feed-through.
- D. Fixtures recessed in furred ceiling shall be installed so that they can be removed from below the ceiling.
- E. Fixtures installed in plastered or solid ceilings shall not be supported directly from the ceiling.
Support fixtures from metal bar hangers, stud framing, or Unistrut channels attached to the structure.
- F. Fixtures installed in acoustical lay-in ceilings shall not be supported directly from ceiling or grid.
Support fixtures from metal bar hangers, rods, or cables attached to the structure.
Install supports per requirements of the NEC, IBC, and local authorities, but never less than two opposing corners.
- G. Provide unswitched "hot" conductor from same circuit serving lighting in that area to provide continuous power to nightlight emergency lighting and exit lighting, whether shown or not.
- H. Make final connections between fixtures and wiring system.
- I. Replace any lamps which do not operate properly, or which have been used for temporary lighting.

END OF SECTION 16500

SECTION 16660 - WIRING FOR EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The other Contract Documents complement the requirements of this Section. The General Requirements apply to the work of this Section.

1.02 SCOPE

- A. Provide materials, labor and supervision necessary to install electric services for all equipment.
- B. In general, the equipment to be wired shall include but not limit to the following:
 - 1. Mechanical Equipment
 - 2. Equipment furnished by Owner.
 - 3. Other equipment as required.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Provide services and make final connections for motors and equipment. Make final connections except where notes on drawings state "rough-in only". Where final connections are not to be made, install outlet box, pull in conductors and leave an 8 inch pigtail for each conductor. Conductors shall be taped and appropriate cover plate installed over box.
- B. Furnish safety disconnects for motors and equipment as needed, so as to make service complete to each item of equipment.
- C. Prior to roughing-in conduit, the Contractor shall consult with Equipment suppliers, and shall verify with them the exact locations for rough-ins, and the exact size and characteristics of the services required, and shall obtain from the Equipment Suppliers a schedule of electrical loads for the equipment furnished by them. These schedules shall be used for verifying services, motor starters, disconnects, fuses and overload protection.
- D. Changes required in the work, due to the Contractor's failure to comply with these requirements, shall be made by the Contractor at no additional cost to the Owner.

END OF SECTION 16660

SECTION 16851 - ELECTRIC DRYERS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Electric hand and hair dryers as shown on Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Division 16 - Electrical Connections and Wiring

1.03 SUBMITTALS

- A. Manufacturer's Literature:
 - 1. Submit manufacturer's "cut sheets" for each item specified, showing installation details, and product information.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to job with manufacturer's unopened packages, with label in tact.
- B. Store and handle products so as to avoid damage. Remove all damaged items from the job site.
- C. Maintain protective covers until Substantial Completion.

1.05 QUALITY CONTROL

- A. All equipment shall be UL Listed for application used.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide products, as approved by the Architect, from one of the following manufacturers:
 - 1. "Bradley"
 - 2. "World Dryer".
 - 3. "Bobrick".
 - 4. "American Dryer".
- B. See Specifications Section 01630 - Product Options and Substitutions.

2.02 ELECTRIC HAND DRYERS (STANDARD VELOCITY TYPE)

- A. Automatic, Stainless:
 - 1. Provide one of the following approved products:
 - a. "World Dryer"; SMARTdri, #K-973 (low speed motor control).
 - b. "Bobrick"; #B-715.
 - c. "American Dryer"; Advantage, #AD90-SS.
 - d. "Saniflow"; Mediflow, #M02ACS.
 - e. "Bradley"; #2902-287400.
 - 2. Stainless steel cover, brushed or satin finish.
 - 3. Surface mounted, one-piece, heavy-duty, concealed mounting.
 - 4. Infrared sensor operation.
 - 5. 120 volt electrical power connection. See Electrical and Division 16.
 - 6. Provide at locations as shown on Drawings.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Finish surfaces shall be complete prior to installation.
- B. Verify all anchoring and supports are in place and properly installed.
- C. Verify all electrical rough-ins are in place and properly installed for surface-mounted units to be installed atop concealed junction box.

3.02 INSTALLATION

- A. Install as recommended by manufacturer's published information.
- B. Install level, plumb and true.

3.03 MOUNTING HEIGHTS

- A. See Drawings for mounting heights.
- B. If not shown on Drawings, confer with Architect for heights required.
- C. All mounting heights shall meet all current Codes and ADA requirements.

3.04 ADJUSTING AND CLEANING

- A. Check operation of units; make final adjustment as required.
- B. Remove protective covers.
- C. Clean stainless steel of all paints, and other markings, with mild detergent and water.

3.05 PROTECTION

- A. Protect from damage until Substantial Completion.
- B. Replace any damaged units.

SUBMITTAL CHECK LIST

- 1. Manufacturer's Literature.

END OF SECTION 16851

SECTION 17010 – OPERATION OF COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide all labor and material required to complete the network installation. This includes all areas within the building, and includes all cable, faceplates, sleeves, fire-stopping, jacks, servers, routers, patch panels and connectors.
- B. Includes minimum requirements for the Data, Voice and Video Networks.
- C. Star topology utilizing structure wiring system is required, based on a Main Distribution Frame (MDF).
- D. Video network will be transported from the Video Headend in the MDF through the Local Area Network. All CATV signals to the various building viewing locations will be digitally encoded.
- E. The Main Distribution Frame (MDF) located in T-Comm 115 shall be used as the central point in the design of the Network. Category 6 Unshielded Twisted Pair cable shall be provided to each device location.
- F. Each drop location is noted on the T drawing plan sheets.

1.02 QUALITY ASSURANCE

- A. The following industry standards are the basis for the structured cabling system described herein:
 - 1. National Electric Code (NFPA-70 78 - 2002)
 - 2. TIA/EIA-568-B Commercial Building Telecommunications Cabling Standard
 - 3. TIA/EIA-569, TIA/EIA-569-B, TIA/EIA-606-A, IEE802.3 LAN Ethernet Standards
 - 4. Installation BICSI Manual, most recent edition
 - 5. J-STD-607A Commercial Building Grounding/Bonding Requirements
 - 6. ISO/IDC 11801 Generic Cabling for Customer Premises
 - 7. The most recent versions of all above documents apply to this project.

1.03 SUBMITTALS

- A. Provide manufacturers product data sheets for all proposed materials and equipment

PART 2 - PRODUCTS

2.01 MATERIALS & EQUIPMENT

- A. Shall be of the quality and manufacturer indicated. The equipment specified is based upon the acceptable manufacturers listed.
- B. Substitutions shall follow procedures outlined in Section 01630.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All equipment and material shall be installed in a neat and workmanlike manner.
- B. All methods of construction not specifically described or indicated in the contract documents shall be subject to control and approval of Architect.

END OF SECTION 17010

SECTION 17050 – INTERIOR COMMUNICATION PATHWAYS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Interior Horizontal and Backbone Cabling Communication Pathways
- B. Pathways include but not limited to:
 - 1. Conduit
 - 2. Innerduct
 - 3. Sleeves
 - 4. Cable Hangers
 - 5. Wireways and Wire Troughs

1.02 RELATED WORK SPECIFIED ELESWHERE

- A. Division 16 - Electrical
- B. Section 17120 - Backbone Cabling Requirements
- C. Section 17130 - Horizontal Cabling Requirements

1.03 QUALITY ASSURANCE

- A. Materials and work specified herein shall comply with the applicable requirements of:
 - 1. National Electric Code (NFPA 70) including the following Articles:
 - a. 318 Cable Trays
 - b. 331 Electrical Nonmetallic tubing
 - c. 348 Electrical metallic tubing
 - d. 349 Flexible metallic conduit
 - e. 350 Flexible metal tubing
 - f. 351 Liquid-Tight Flexible metal conduit and Liquid-Tight flexible nonmetallic conduit.
 - g. 352A Surface Metal Raceways
 - h. 352B Surface Nonmetallic raceways.
 - i. 353 Multioutlet Assembly
 - j. 354 Underfloor raceways
 - k. 362 Metal Wireways and nonmetallic Wireways
 - l. 370 Outlet, Device, Pull and Junction Boxes, Conduit Bodies and Fittings
 - m. 645 Information Technology Equipment
 - n. 770 Optical Fiber Cables and Raceways
 - o. 800 Communications Circuits
 - 2. ANSI-C80.3 Specifications for Electrical Metallic Tubing, Zinc-coated.
 - 3. Telecommunications Industry Association (TIA) standards:
 - a. ANSI/TIA/EIA-568-B Commercial Building Telecommunications Cabling Standard
 - b. ANSI/TIS/EIA-569-A Commercial Building Standard, Telecommunications Pathway & Spaces
 - c. EIA/TIA-606-A Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
 - d. EIA/TIA-607 Commercial Building Grounding and Bonding requirements for Telecommunications
 - 4. The following BICSI guidelines
 - a. BICSI Telecommunications Distribution Design Manual (11th edition)
 - b. BICSI Customer Owned Outside Plant Design Manual (4th edition)
 - c. BICSI Telecommunications Cabling Installation Manual (5th edition)

5. The following UL Standards.
 - a. UL 1, 2000 Flexible Metal Electrical Conduit
 - b. UL 3, 1999 Flexible Nonmetallic Tubing for Electric Wiring
 - c. UL 5, 1996 Surface Metal Electrical Raceways and Fittings
 - d. UL 360, 1996 Liquid-Tight Flexible Steel Conduit, Electrical
 - e. UL 514B, 1996 Fittings for Conduit and Outlet Boxes
 - f. UL 797, 1997 Electrical Metallic Tubing
 - g. UL 870, 1995 Electrical Wireways, Auxiliary Gutters and Associated Fittings.

1.04 SUBMITTALS

- A. Product Data for:
 1. Conduit
 2. Sleeves
 3. Cable Hangers
 4. Wireways and Wire Troughs

PART 2 - PRODUCTS

2.01 CONDUIT

- A. Rigid Non-Metallic PVC Conduit:
 1. Heavy wall, Schedule 40
 2. Rated for use with 90 degree C conductors
 3. UL listed for direct burial and concrete encasement
- B. Fittings for Rigid Non-Metallic PVC Conduit
 1. Solvent cementing type
 2. Insulated throat up to and including 1"
 3. Plastic bushing for sizes 1-1/4" and larger
 4. Conduit body types, shapes and sizes as required to suit application and NEC requirements.

2.02 INNERDUCT

- A. PVC Riser rated or plenum rated as required.
- B. Size: 1-1/4" diameter
- C. Color: Orange
- D. UL Listing: 2024 Standard

2.03 CABLE HANGERS

- A. Prefabricated, zinc coated, carbon steel, wide base hangers designed specifically for UTP and Optical Fiber cable installations.
- B. Open top, rolled edges and a 2" to 4" minimum diameter loop as required.
- C. Beam clamps, rod fasteners, flange clips and brackets as job conditions require.

PART 3 - EXECUTION

3.01 CONDUIT

- A. Electrical Metallic Tubing, Rigid Metal Conduit and Rigid PVC are allowed conduit. Flexible metal conduit is not allowed.

- B. Conduit runs to work areas shall service no more than one (1) communication outlet.
- C. Conduits shall be sized to accept 50% future growth; sizing shall account for fire code capacity restrictions.
- D. Identification: Clearly label conduit at exposed ends indicating closet or outlet where conduit terminates.
- E. Fire stop all pathways as previously specified in the Project Manual.
- F. All backbone conduits shall be marked with 1" reflective tape every 25 feet.
- G. Bush all conduit ends not bushed by Division 16.

3.02 CABLE HANGERS

- A. Provide cable hangers a maximum 3 feet center/center wherever cable tray or conduit is not present.
- B. Ceiling ties and rods shall not be used to hang cable or cable supports without Architect approval.
- C. Load hangers per manufacturers recommendations. Provide hangers side by side on a common bracket where cable quantities require.
- D. Do not install cables loose above non-accessible ceilings
- E. Install cables minimum 6 inches above lay-in ceiling tile. Cables shall **not touch** the ceiling.
- F. Do not support cable from ceiling system tie wires or grid in fire rated systems
- G. Utilize "Erico Caddy Cablecat" adjustable cable support when cable trays are not available. Review locations with Architect prior to use.

3.03 SUPPORTING DEVICES

- A. Provide steel angles, channels and other materials necessary for the proper support of wall-mounted cabinets, racks, panels, etc.
- B. Cabinets, large pull boxes, and cable support boxes shall be secured to ceiling and floor slab and not supported from conduits. Small equipment boxes, etc. as approved by Architect, may be supported on walls.
- C. Racks for support of conduit and heavy equipment shall be secured to building construction by substantial structural supports.

3.04 GENERAL

- A. Support raceways from building construction. Do not support from ductwork, piping or equipment hangers.
- B. Support outlet, pull and junction boxes independently from building construction. Do not support from raceways.
- C. Coordinate all raceway runs with other trades.

- D. Install all open raceways minimum 6 inches away from any light fixture or other source of EMI (Electromagnetic interference)
- E. Bond and ground all horizontal pathways per NEC Article 250.
- F. All horizontal pathways shall be sized for a minimum of 50% future growth.

SUBMITTAL CHECKLIST

1. Product Data

END OF SECTION 17050

SECTION 17080 – TESTING, IDENTIFICATION AND ADMINISTRATION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Minimum requirements for the testing, certification, administration and identification of backbone and horizontal cabling.

1.02 RELATED WORK SPECIFIED ELESWHERE

- A. Division 16 - Electrical.
- B. Division 17 - Technology.

1.03 QUALITY ASSURANCE

- A. All testing procedures and testers shall comply with applicable requirements of:
 - 1. ANSI/TIA/EIA-568-B.1 Commercial Building Telecommunications Cabling Standard, Part 1 General Requirements.
 - 2. ANSI/TIA/EIA-526-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant.
 - 3. ANSI/TIA/EIA-526-14A Measurement of Optical Power Loss of Installed Multimode Fiber Cable Plant.
- B. Identification and administration work specified herein shall comply with the applicable requirements of:
 - 1. ANSI/TIA/EIA-606-A Administration Standards.
 - 2. ANSI/TIA/EIA-569-A Pathway and Spaces.
 - 3. ANSI/TIA/EIA-568-B Telecommunications Cabling Standard.
 - 4. ANSI/TIA/EIA-758-A Customer Owned Outside Plant Telecommunications Cabling Standard.
 - 5. BICSI Telecommunications Cabling Installation Manual.
 - 6. BICSI Telecommunications Distribution Methods Manual.

1.04 SUBMITTALS

- A. Test Reports.

PART 2 - PRODUCTS

2.01 OPTICAL FIBER CABLE TESTERS

- A. Multimode optical fiber light source:
 - 1. Capable of testing to TIA 568-B.1 and ANSI/TIA/EIA-526-14A criteria.
 - 2. Meet the launch requirements of ANSI/TIA/EIA-455-50B.
 - 3. Provide 850nm and 1300 nm +/- 20 nm wavelength LED light sources.
 - 4. Spectral width of sources shall be <= 50nm for 850 wavelengths and <= 140 nm for 1300 nm wavelengths.
 - 5. The output of the light source shall be 8 MW for 62.5um core optical fiber.
 - 6. Output Stability +/- 0.40 dB from 0 to 50 degrees C.
 - 7. Long Term output stability +/- 0.10dB at 25 degrees C.
 - 8. Power shall be from rechargeable Ni-Cad batteries.
 - 9. Connector types shall include MTRJ, ST and SC.
 - 10. Acceptable Manufacturers:
 - a. Fluke: DPS2000 + Fiber Test Kit.

- B. Power Meter:
 - 1. Capable of testing to TIA 568-B.1 criteria.
 - 2. Provide 850nm, 1300 nm and 1500 nm +/- 20nm wavelength test capability.
 - 3. Measurement range shall be from 10 to -60 dBm.
 - 4. Accuracy shall be +/- 5% at 0 to -50dBm and +/- 10% 10 to 0 dBm and 50 to 60 dBm.
 - 5. Resolution shall be 0.1 dB.
 - 6. Connector types shall include: ST and SC.
 - 7. Acceptable Manufacturers:
 - a. Fluke: Model 43 B.

- C. Optical Time Domain Reflectometer (OTDR):
 - 1. Capable of testing to TIA 568-B.1 criteria.
 - 2. Front CRT display.
 - 3. Connector types include: ST and SC.
 - 4. Acceptable Manufacturers:
 - a. Fluke.

2.02 100 OHM UTP TESTER

- A. Capable of testing to TIA 568-B.1 criteria.

- B. Physical interface shall be modular RJ-45 connector and a serial port with DB-9 connector.

- C. Auto Testing to determine if cable meets requirements of TIA/EIA 568-B.1, ISO Class C, D, 10 Base-T, Token Ring, Fast Ethernet and ATM Standards.

- D. Acceptable Manufacturer: Fluke.

2.03 LABELS

- A. Meet legibility, defacement, exposure and adhesion requirements of UL 969.

- B. Preprinted or laser printed type.

- C. Where used for cable marking, provide vinyl substrate with a white printing area and a clear "tail" that self-laminates the printed area when wrapped around the cable.

- D. Where insert type labels are used, provide clear plastic cover over label.

- E. A standard style, **size 10, bold** font type shall be used when making faceplate labels. Cable Management Inventory Record shall be used to record all installation details.

- F. Acceptable Manufacturers: Brothers.

PART 3 - EXECUTION

3.01 OPTICAL FIBER CABLE TESTING

- A. Test all fibers with launch and far end cable of sufficient length for the OTDR to be able to see through all installed connectors.

- B. Localized attenuation shall not exceed 0.50 dB at any point.

- C. Backbone multimode fiber shall be tested at both 850nm and 1300 nm in accordance with ANSI/EIA/TIA-526-14A method B.

3.02 100 OHM UTP CABLE TESTING

- A. Testing parameters include horizontal Link/channel for all installed drop locations.
- B. Test cable with test set to match NVP for the cable as stated by the cable manufacturer.
- C. Test parameters shall include Wire Map, Length, Attenuation, PSNEXT, PS-ACR, PS-ELFEXT and Return-Loss.
- D. Wire Map:
 - 1. Verify pair to pin termination at each end and check for conductivity errors.
 - 2. Wire map shall indicate the following for each of the eight conductors:
 - a. Continuity to remote end.
 - b. Shorts between any two or more conductors.
 - c. Crossed Pairs.
 - d. Reversed Pairs.
 - e. Split Pairs.
 - f. Any other miss wiring.
- E. Minimum acceptable cable performance per criteria established in TIA/EIA-568-B.1 Category 6 (TIA/EIA 568-B.2-1).

3.03 IDENTIFICATION AND LABELING

- A. Conform to specific labeling requirements outlined below during cable installation and termination.
- B. Backbone cables shall be marked at each endpoint and at all intermediate pull/access points or junction boxes.
- C. Backbone label shall indicate:
 - 1. Origination TR ID.
 - 2. Destination TR ID.
 - 3. Sheath ID.
 - 4. Strand or Pair Range.
- D. Horizontal cable shall be marked at each end and on the sheath and indicate:
 - 1. Ultimate destination location.
 - 2. Telecommunications Room, MDF or IDF location.
 - 3. Patch Panel.
 - 4. Panel Port.
- E. All new UTP cable runs shall be numbered before the run and shall be labeled **consecutively** with a unique identification numbering scheme. No new drops shall be duplicated with like numbers. This unique identification numbering scheme is as follows:
 - 1. **XX-Y-ZZ.**
 - 2. XX is a 2-digit number representing a closet number, such as 00, 01, 02, etc. with 00 being the MDF and 01 is IDF-1, etc.
 - 3. Y indicates the corresponding patch panel ID. Patch panels should be labeled starting with the letter A and progress thru the alphabet for each additional panel.
 - 4. ZZ is a 2-digit number representing the number of the patch panel port on which the cable terminates. This number should range from 1 thru 24 or 1 thru 48.

5. An example would be 00-A-22, where '00' is the MDF, 'A' is patch panel A and '22' is port 22 on patch panel A.

F. Faceplates and Patch Panels:

1. Optical Fiber Patch Panels:
 - a. Mark fiber patch panels with adhesive labels indicating the range of circuits installed in it.
 - b. Label each port with origination, destination and individual strand ID.
2. Faceplates:
 - a. Label to indicate MDF/IDF number (00 thru 0?), patch panel label (A thru Z) and patch panel (1 thru 24 or 1 thru 48) to which the cable is wired for each cable it houses.

3.04 RECORD COPY AND AS-BUILT DRAWINGS

- A. Provide record copy drawings (in CAD format) periodically throughout the project as requested by the Architect and at end of the project.
- B. Record copy drawings shall include notations reflecting the as-built conditions of any additions to or variation from the drawings provided.
- C. Provide hard copy and electronic copy of cable inventory which includes all circuit numbers for UTP.

3.05 TEST RESULTS

- A. Horizontal Copper Cabling:
 1. Contractor shall test all cables and submit all horizontal copper cable test result data in electronic format, with the resulting file formatted with one (1) test result per 8.5" x 11" page.
 2. Provide the test results in an acceptable format:
 - a. Export or download test results from cable tester to a **.txt** format.
 - b. Open the **.txt** file in Microsoft Word and save the file as a **.doc** file.
 3. Provide all test results in a 3-ring binder (maximum 3").
 4. Label binders
- B. Fiber Optic Cables:
 1. Test all fiber optic cables and submit all fiber test result data in an electronic format.
 2. Provide one (1) hard copy of the test results showing graphically, the entire length of the fiber.
- C. Contractor shall submit (one) 1 copy of software capable of viewing the electronic test results.

SUBMITTAL CHECKLIST

1. Product Data for Testing Equipment.
2. Test Reports.

END OF SECTION 17080

SECTION 17090 – SUPPORT AND WARRANTY

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. All labor, materials, tools, equipment and certifications required for the complete installation of work required by the Contract Documents.

1.02 CONTRACTOR SUPPORT

- A. Certifications:
 - 1. Cabling installer must be certified.
 - 2. Contractor must have more than 10% of field staff BISCO certified.
- B. Repair Service Labor:
 - 1. Shall make all repairs or replacements to fulfill obligations of the warranty at no additional cost to the Owner.
 - 2. This labor guarantee shall be in full effect for a minimum of 5 years.

1.03 MANUFACTURER WARRANTY

- A. Cable Manufacturer:
 - 1. Provide extended warranty protection for a minimum of 25 years.
 - 2. Cover all manufacturer's products within the cable installation.
 - 3. Shall cover repair or replacement of any length of product found to be defective or not performing to capabilities and specifications of the product.
 - 4. Shall be written for the entire dollar value of the cable's original installation, to allow for full replacement of the cable product if necessary.
- B. Cabling Contractor:
 - 1. Shall be responsible for registering the project on behalf of the Owner.
 - 2. Shall submit the warranty in full effect as part of the closeout documentation.

1.04 SUBMITTALS

- A. Cable manufacturer's warranty information.
- B. Certifications of Contractor and installers.
- C. Contractor labor guarantee for service repair.

SUBMITTAL CHECKLIST

- 1. Cable Manufacturer's Warranty information.
- 2. Contractor Certifications.
- 3. Contractor Labor Guarantee.

END OF SECTION 17090

SECTION 17100 – TELECOMMUNICATION ROOMS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The Main Distribution Frame (MDF) located in Data 106.

- B. Minimum installation requirements for equipment and cabling infrastructure to Telecommunications Rooms, including but not limited to the following:
 - 1. Floor Mounted Cabinet
 - 2. Cable Management Hardware
 - 3. Cable Supports/Ladder Rack
 - 4. Category 6 Patch Panels
 - 6. Fiber Patch Panel
 - 7. Punch Down Blocks
 - 8. Grounding Bars
 - 9. Power Strips

1.02 RELATED WORK SPECIFIED ELESWHERE

- A. Division 16 - Electrical.
- B. Section 17080 - Testing.
- C. Division 17 - Technology.

1.03 QUALITY ASSURANCE

- A. Materials and work specified herein shall comply with the applicable requirements of:
 - 1. ANSI/TIA/EIA-568-B Commercial Building Telecommunications Cabling Standard
 - 2. ANSI/TIA/EIA-569-A Commercial Building Standard for Telecommunication Pathway and Spaces
 - 3. TIA/EIA-606-A Administration Standards for Telecommunications Infrastructure
 - 4. TIA/EIA-607-Commercial Building Grounding and Bonding Requirements for Telecommunications
 - 5. NEMA-250
 - 6. Federal Communication Commission 47 CFR 68
 - 7. BICSI Telecommunications Distribution Design Manual (11th edition)
 - 8. BICSI Customer Owned Outside Plant Design Manual (5th edition)
 - 9. BICSI Telecommunications Cabling Installation Manual (5th edition)
 - 10. ANSI/NECA/BICSI-568-2001 Standard for Installing Commercial Building Telecommunications Cabling.
 - 11. ADA-Americans with Disabilities Act
 - 12. NFPA 70 - 2002 including:
 - a. NEC Article 770
 - b. NEC Article 800
 - 13. Underwriters Laboratory

1.04 SUBMITTALS

- A. Manufacturer's catalog sheets and specifications for all equipment and components.

PART 2 - PRODUCTS

2.01 FLOOR MOUNTED CABINET (MDF)

- A. Acceptable Manufacturers
 - 1. Panduit "Net Access"
 - 2. Hubbell
 - 3. Middle Atlantic
 - 4. Belden

- B. Floor mounted cabinets shall meet the following requirements:
 - 1. Universal mounting rails with 10/32 and 12/24 tapped holes: 5/8", 5/8", 1/2" EIA standard hole pattern.
 - 2. 12 or 14 gage steel construction
 - 3. Dimensions: 84" x 24" x 42"
 - 4. Leveling feet

2.02 CABLE MANAGEMENT

- A. Acceptable Manufacturers
 - 1. Panduit "Net Manager"
 - 2. Hubbell
 - 3. Leviton
 - 4. Belden

- B. Cable management shall meet the following requirements:
 - 1. Plastic with integral wire retaining fingers
 - 2. Front and back channels
 - 3. Removable front and back covers with front cover hinges up and down
 - 4. 3" wide x 3" deep on front channel and 2" x 4" on rear channel

2.04 LADDER RACK

- A. 12" ladder rack in TR as shown on drawings for horizontal cable support as needed.

- B. Include connecting support hardware to suit installation, including but not limited to:
 - 1. Rack to runway mount plate
 - 2. Wall angle support bracket
 - 3. Butt splice swivel
 - 4. Connect junction
 - 5. Grounding Kit (Metallic ladder racks must be grounded)

- C. Rack shall be a hollow or solid side bar, nominally 3/8" thick x 1-1/2" high with rungs 9" on center

- D. Finish: Grey or Black factory painted.

2.05 CATEGORY 6 UTP PATCH PANELS

- A. Acceptable Manufacturers
 - 1. Panduit "Net Manager"
 - 2. Hubbell
 - 3. Leviton
 - 4. Belden

- B. Patch panels shall meet the following requirements:
 - 1. Meet or exceed all Category 6 component performance standards per TIA 568-B.2-1
 - 2. Ports: 48 per panel
 - 3. Paired punch down sequence to allow pair twists within 1/2" of the termination
 - 4. UL Listed
 - 5. 110 IDC terminations
 - 6. Sized for standard 19" equipment rack and in all cases have 48 ports.
 - 7. Equipped with rear cable support bars
 - 8. Clearly labeled.

2.06 FIBER OPTIC PATCH PANEL

- A. Acceptable Manufacturers
 - 1. Panduit "Opticom"
 - 2. Hubbell
 - 3. Leviton
 - 4. Belden
- B. Patch panel shall meet the following requirements:
 - 1. Meet or exceed all performance standards per TIA 568-B.3
 - 2. Ports: 24 per panel
 - 3. Rack mounted
 - 4. Accept 6 Pack SC adapter panels
 - 5. Connect multimode fiber to orange bulkheads.

2.07 UTP CROSS CONNECT

- A. Acceptable Manufacturers
 - 1. Avaya
- B. Meet the following requirements:
 - 1. Modular 110 cross connect blocks for all backbone UTP terminations
 - 2. Constructed of wire of equal gage to feed cable to which it is being connected.
 - 3. UL Listed
 - 4. Provide (1) roll of 1 pair and (1) roll of 2 pair per TR

2.08 GROUNDING BARS

- A. Provide telecommunication grounding bar (TGB) assembly as shown on drawings and #6 grounding wire from ground bar telecommunications grounding system.
- B. Grounding wire shall be bonded to telecommunications main ground bar (TMGB). The TMGB shall be grounded to the main electrical service grounding electrode system.
- C. NEMA approved ground bar assembly to meet following requirements:
 - 1. Copper Ground Bar (1/4" x 4" x 10") with 9/32" holes spaced 1-1/8" apart
 - 2. Insulators
 - 3. 5/8" lock washers
 - 4. Wall mounting brackets
 - 5. 5/8" x 11" x 1" HHCS bolts.

2.09 POWER STRIP

- A. Acceptable Manufacturers
 - 1. Isobar
 - 2. Interlink

- B. Provide (2) power strips per cabinet which meet the following requirements:
 - 1. 20 amp, 115 volt
 - 2. Rack mounted and rear facing
 - 3. Non-switched
 - 4. Surge suppressed
 - 5. 6 outlets - transformer spaced
 - 6. Power chord, 10 feet length
 - 7. UL 1363 and 1449

PART 3 - EXECUTION

3.01 FLOOR MOUNTED CABINETS

- A. Anchor cabinets to floor.

- B. Install vertical and horizontal cable management as approved by Architect.

- C. Final placement of cabinets shall be verified with Architect.

- D. Ground cabinets to the equipment ground bar with #6 copper wire

3.02 LADDER RACK

- A. Install per manufacturers recommendations

- B. Secure to walls and top of equipment rack.

- C. Ground all metallic components of ladder rack.

3.03 CABLE MANAGEMENT

- A. Install one 3-1/2" horizontal cable manager above each 48 UTP port patch panel and fiber patch panel.

- B. Install one 3-1/2" horizontal cable manager below each switch.

3.04 PATCH PANELS

- A. Install per manufacturer's recommendations.

- B. Verify final rack configuration with Architect

3.05 OPTICAL FIBER PATCH PANELS

- A. Verify location with Architect

- B. Install labels for each strand.

- C. Install blank adapter panels in all positions not used at time of installation for fiber terminations.

3.06 CABLE SUPPORTS

- A. Install category-6 cable brackets 3 feet on center, supported by building structure for all horizontal cable runs not supported by cable tray.

3.07 GROUNDING AND BONDING

- A. Install copper bus in Telecommunications Room(s).
- B. Bond metallic equipment racks, conduits, cable tray, ladder racks to ground bar
- C. All connectors and clamps to be mechanical type made of silicon bronze.
- D. Terminals shall be solderless compression type, copper long-barrel NEMA two bolt.
- E. Bond the shield of shielded cable to the ground bar in Telecommunications Room.

3.08 CROSS CONNECT

- A. Cross connects shall be made with 1 pair and 2 pair wire as required by circuit being connected.
- B. Coordinate cross connect colors.

3.09 MISCELLANEOUS

- A. All cables shall be neatly "dressed out" in equipment rooms and throughout project.
- B. Fire-stop all sleeves and conduit openings after cable installation is complete.

3.10 FINAL CLEANING

- A. All cabinets shall be thoroughly cleaned, INSIDE AND OUTSIDE,
- B. Remove all excess material, trash, cuttings and scraps.
- C. Telecommunications Room(s) shall be thoroughly vacuumed, walls wiped down and cables cleaned.
- D. Final payment will not be approved until room is cleaned to satisfaction of the Architect.

SUBMITTAL CHECKLIST

- 1. Product Data Sheets

END OF SECTION 17100

SECTION 17110 –SERVICE ENTRANCE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Building Service Entrance Demarcation Terminal
- B. Voice demarcation in the MDF
- C. Minimum installation requirements for service to the Data Room, including but not limited to the following:
 - 1. Building Entrance Terminal
 - 2. Enclosed Splice Box
 - 3. Utility Coordination

1.02 RELATED WORK SPECIFIED ELESWHERE

- A. Division 16 - Electrical
- B. Section 17100 - Telecommunications Room
- B. Section 17120 - Backbone Cabling Requirements
- C. Section 17130 - Horizontal Cabling Requirements

1.03 QUALITY ASSURANCE

- A. Materials and work specified herein shall comply with the applicable requirements of:
 - 1. ANSI/TIA/EIA-568-B Commercial Building Telecommunications Cabling Standard
 - 2. ANSI/TIA/EIA-569-A Commercial Building Standard for Telecommunication Pathway and Spaces
 - 3. TIA/EIA-606-A Administration Standards for Telecommunications Infrastructure
 - 4. TIA/EIA-607-Commercial Building Grounding and Bonding Requirements for Telecommunications
 - 5. NEMA-250
 - 6. Federal Communication Commission 47 CFR 68
 - 7. BICSI Telecommunications Distribution Design Manual (11th edition)
 - 8. BICSI Customer Owned Outside Plant Design Manual (5th edition)
 - 9. BICSI Telecommunications Cabling Installation Manual (5th edition)
 - 10. ANSI/NECA/BICSI-568-2001 Standard for Installing Commercial Building Telecommunications Cabling.
 - 11. ADA-Americans with Disabilities Act
 - 12. NFPA 70 - 2002 including:
 - a. NEC Article 770
 - b. NEC Article 800
 - 13. Underwriters Laboratory

1.04 SUBMITTALS

- A. Manufacturer's catalog sheets and specifications for:
 - 1. Building Entrance Terminal

PART 2 - PRODUCTS

2.01 BUILDING ENTRANCE TERMINALS

- A. Splice Box
 - 1. Enclosed cabinet, wall mounted where fiber optic utility service enters building
 - 2. Size as required for connecting utility fiber optic with building fiber.

PART 3 - EXECUTION

3.01 COORDINATION

- A. Review building entrance location with utility company, Metro Net.
- B. Provide required separation from electric service to prevent harmonic or electric field interference

3.02 SPLICE BOX

- A. Mount on wall.

END OF SECTION 17110

SECTION 17130 – HORIZONTAL CABLING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Horizontal cabling is the portion of the UTP cabling system, and other types of cabling, that extends from the work areas to the Main Distribution Frame (MDF) or Intermediate Distribution Frame (IDF). The horizontal cabling shall be configured in a star topology, and include horizontal cables, the mechanically terminated jacks/inserts and the faceplates in the work areas.

- B. This section also includes minimum requirements for the following:
 - 1. Category 6 UTP Cable.
 - 2. Category 6 UTP Cable (Underground Type).
 - 3. Category 6 Patch Cords and Cables.
 - 4. Category 6 Jacks.
 - 5. Ethernet and PoE Line Extenders.
 - 6. Faceplates.
 - 7. Control Wiring.
 - 8. Speaker Wiring.
 - 9. Coaxial Cable.
 - 10. HDMI Cable.
 - 11. RCA Audio/Video Cable.
 - 12. VGA Cable.
 - 13. Audio/Video Connectors.
 - 14. Wall Phone Jack Assembly.
 - 15. Multi-Media Cable Wall Plates.
 - 16. Recessed Television Connection Outlets.
 - 17. Installation and Termination Methods.

1.02 RELATED WORK SPECIFIED ELESWHERE

- A. Division 16 - Electrical.
- B. Division 17 - Technology.
- C. Section 17080 - Testing, Identification and Administration.

1.03 QUALITY ASSURANCE

- A. Strictly adhere to all Category 6 installation practices when installing UTP data cabling.

- B. Materials and work specified herein shall comply with the applicable requirements of:
 - 1. ANSI/TIA/EIA-568-B Commercial Building Telecommunications Cabling Standard.
 - 2. ANSI/TIA/EIA-569-A Commercial Building Standard for Telecommunication Pathway and Spaces.
 - 3. TIA/EIA-606-A Administration Standards for Telecommunications Infrastructure.
 - 4. TIA/EIA-607-Commercial Building Grounding and Bonding Requirements for Telecommunications.
 - 5. NEMA-250.
 - 6. Federal Communication Commission 47 CFR 68.
 - 7. BICSI Telecommunications Distribution Design Manual (11th edition).
 - 8. BICSI Customer Owned Outside Plant Design Manual (5th edition).
 - 9. BICSI Telecommunications Cabling Installation Manual (5th edition).
 - 10. ANSI/NECA/BICSI-568-2001 Standard for Installing Commercial Building Telecommunications Cabling.
 - 11. ADA - Americans with Disabilities Act.

12. NFPA 70 - 2002 including:
 - a. NEC Article 770.
 - b. NEC Article 800.
13. Underwriters Laboratory (UL).

1.04 SUBMITTALS

- A. Manufacturer's catalog sheets and specifications for all products to be installed.
- B. Test Results and Documentation per Section 17080.

PART 2 - PRODUCTS

2.01 CATEGORY 6 UTP CABLE (CAT CABLE)

- A. Acceptable Manufacturer and Equipment:
 1. "General Cable"; GenSpeed 6000 Enhanced.
 2. "Belden"; Data Twist 4800.
 3. "Panduit"; Pan-Net TX6000.
 4. "Hubbell"; NEXTSPEED.
 5. "Remeo"; Category 6, 550MHz.
- B. Physical Characteristics:
 1. Plenum rated cable.
 2. Consist of (4) 23 or 24 AWG twisted copper pairs, 100OHM. All pairs individually insulated.
 3. Color Coding:
 - a. Pair 1: Blue-White/Blue.
 - b. Pair 2: Orange-White/Orange.
 - c. Pair 3: Green-White/Green.
 - d. Pair 4: Brown-White/Brown.
 4. Fluoropolymer insulation and low-smoke, flame-retardant PVC jacket.
 5. Manufacturer's cable is required to test to 400MHz minimum and validated to 250MHz standards.
 6. Cable to withstand a bend radius of 1 inch at -20 degrees C without jacket or insulation cracking.
 7. Provide cables from all workstation ultimate outlet and device locations and terminated to patch panels in MDF or IDF as indicated on the Drawings.
- C. Compliances:
 1. Transmission Characteristics shall meet or exceed ANSI/TIAEIA 568-B.2 or ANSI/TIAEIA 568-C.2.
 2. Shall meet applicable requirements of ANSI/ICEA S-80-576.
 3. Ultimate breaking strength of 400 N minimum measured in accordance with ASTM D 4565.
 4. Labeled third party "Verified Category 6".
- D. Color:
 1. Blue: Data.
 2. Green: Security Cameras.
 3. Purple: Wireless.
 4. Yellow: Access Control.
 5. Grey: Phone.
 6. White: Intercom

2.02 CATEGORY 6 UTP CABLE (UNDERGROUND TYPE CAT CABLE)

- A. Acceptable Manufacturer and Equipment:
 1. See listings for typical Category 6 UTP Cable, with ratings for Outdoor.

- B. Physical Characteristics:
 - 1. Same cabling and performance as all other Category 6 Cable, except rated for use in underground installations or within conduits to the exterior.
 - 2. Use for all installations to components installed underground or underslab, whether indicated or not; such as to floor boxes, cameras within un-insulated soffits or spaces, etc.
 - 3. Use for all installations to components installed to exterior locations or installed in exterior conduit, whether indicated or not; such as to site lite poles, exterior signs, cameras to exterior poles, etc.
 - 4. All connections and fittings to also be rated for applicable use and installation.

C. Color: per system schedule

2.03 CATEGORY 6 PATCH CORDS AND CABLES

- A. Acceptable Manufacturer and Equipment:
 - 1. See listings for typical Category 6 UTP Cable.
- B. Physical Characteristics:
 - 1. Same performance as all other Category 6 Cable.
 - 2. Data jacks pre-installed at each end of cable.
 - 3. 50% in 5 feet length and 50% in 10 feet length.
 - 4. Provide one patch cable per terminated port in the MDF and IDF.
- C. Color:
 - 1. Blue: Data.
 - 2. Green: Security Cameras.
 - 3. Purple: Wireless.
 - 4. Yellow: Access Control.
 - 5. Grey: Phone.
 - 6. White: Intercom

2.04 CATEGORY 6 JACKS

- A. Acceptable Manufacturers and Equipment:
 - 1. "Panduit"; MiniCom Cat6 CJ688.
 - 2. "Panduit"; #CJ688TG Modular Jack.
 - 3. "Belden"; GigaFlex 6+.
 - 4. "Hubbell"; NEXTSPEED Cat6.
- B. Physical Characteristics:
 - 1. Functional from -10 degrees F to 140 degrees F.
 - 2. Meet or exceed ANSI/TIAEIA 568-B.2 or ANSI/TIAEIA 568-C for Category 6.
 - 3. Modular RJ45 jacks that snap into configured faceplates meeting IEC 603-7 durability requirements.
 - 4. 110 IDC, RJ45 type suitable for eight 22-26 AWG wires and be certified Category 6 compliant.
 - 5. Wired in accordance with EIA/TIA T568B polarization sequence.
- C. Color:
 - 1. Blue: Data.
 - 2. Green: Security Cameras.
 - 3. Purple: Wireless.
 - 4. Yellow: Access Control.
 - 5. Grey: Phone.
 - 6. White: Intercom

2.05 ETHERNET AND PoE LINE EXTENDERS

- A. Acceptable Manufacturers and Equipment:
 - 1. "Nitek"; Ether Stretch, #EL1500U.

- B. Physical Characteristics:
 - 1. Allow for Ethernet and PoE lines of cable to be extended up to 600 meters (2,000 feet) to overcome cable network distance limitations.
 - 2. System containing two separate devices, a transmitter unit and a receiver unit.
 - 3. Shall require no setup or configuration and no network settings to be changed or adjusted.
 - 4. Shall be transparent to the network without MAC or IP addressing.
 - 5. Connections for inline installation of cable run into the networking ports of the transmitter and receiver for immediate communication to network devices.
 - 6. LED indicators for status of network communication and PoE power.
 - 7. Surge protected inputs.
 - 8. Support 10/100 and PoE.

- C. Provide for all line cable runs which exceed the maximum cable length specified for UTP cable.

2.06 FACEPLATES

- A. Acceptable Manufacturers:
 - 1. "Panduit".
 - 2. "Belden".
 - 3. "Hubbell".
 - 4. "Interlink".
 - 5. "Leviton".
 - 6. "Phillips".
 - 7. "Axis".
 - 8. "TecNec".
 - 9. "Wiremold".

- B. Description:
 - 1. High impact resistant, thermoplastic, front-loading, flush-mounted design.
 - 2. Integral cable labels and easy snap-in assembly.
 - 3. Typical single gang faceplates shall be 2.75" x 4.5" and accept snap-in modules in 3-unit combinations.
 - 4. Typical double gang faceplates shall be 4.5" x 4.5" and accept snap-in modules in 6-unit combinations.
 - 5. Provide for special connections and configurations as indicated on the Drawings or as otherwise required for connections to specific components, whether specifically indicated or not.
 - 6. UL listed.

- C. Color: White.

2.07 CONTROL WIRING

- A. Acceptable Manufacturers and Equipment:
 - 1. "Belden"; EIA-485 Cable.

- B. Physical Characteristics:
 - 1. Plenum rated cable.
 - 2. 24 AWG stranded, tinned copper conductors.
 - 3. 2-pair.

4. Foam FEP insulation with flexible plenum jacket.
5. TC braid shielding, 90% coverage.

C. Color: Grey, Black, or White.

2.08 SPEAKER WIRING

A. Acceptable Manufactures:

1. "Belden".
2. "West Penn Wire".
3. "General Cable".
4. "Priority Wire and Cable".

B. Physical Characteristics:

1. Plenum rated cable.
2. 16 AWG stranded, (2) copper conductors. Individually insulated.
3. Shielded.

C. Color: Grey, Black, or White.

2.09 COAXIAL CABLE (COAX)

A. Acceptable Manufacturer and Equipment:

1. "West Penn Wire"; #25806.

B. Physical Characteristics:

1. Plenum rated cable.
2. RG6/U Type CCTV.
3. 18 AWG solid stranding, (1) center conductor, 95% bare copper braid.
4. Foam FEP insulation with flexible plenum PVC jacket.
5. 75 OHMS nominal impedance.

C. Compliances:

1. UL Listed.
2. CMP NEC rating.
3. UL NFPA 262 flame rating.

D. Color: Ivory.

2.10 VGA CABLE

A. Acceptable Manufactures:

1. "Belden".
2. "West Penn Wire".
3. "General Cable".

B. Physical Characteristics:

1. Plenum rated cable.
2. Pre-made cable of coaxial design.
3. 28 AWG minimum copper conductors. Individually insulated.
4. Verify type, male/female, and pin configuration required at each end of cable.

C. Color: Black.

2.11 AUDIO/VIDEO CONNECTORS

- A. Acceptable Manufacturers:
 - 1. "Panduit".
 - 2. "Belden".
 - 3. "Hubbell".

- B. Provide connector modules for faceplates and components as designated in schematic drawings and as required for each connector and equipment condition to include:
 - 1. HDMI:
 - a. Female connector in faceplate, where applicable.
 - b. Male connector at each end of cable.
 - c. Gold plated connectors.
 - 2. RCA:
 - a. Left audio jack at each end.
 - b. Right audio jack at each end.
 - c. Composite Video at each end.
 - d. Color separated indicators for each use.
 - e. Gold plated pin connectors.
 - 3. VGA:
 - a. Female connector in faceplate, where applicable.
 - b. Verify type, male/female, and pin configuration required to component at each end of cable.
 - c. Gold plated connectors and gold plated copper contacts.
 - d. (2) manual locking screw twist pins.

- C. Color: White.

2.12 WALL PHONE WALL JACK ASSEMBLY

- A. Acceptable Manufacturers:
 - 1. "Belden".
 - 2. "Hubbell".
 - 3. "Panduit".

- B. Components:
 - 1. Stainless steel.
 - 2. Flush jack module.
 - 3. Mounting lugs designed to mate with telephone base plate or adapter.
 - 4. Wired to TIA-568B.

- C. Designed for mounting to single gang outlet box.

- D. Verify mounting compatibility with proposed phone sets.

2.13 MULTI-MEDIA CABLE WALL PLATES

- A. Wall Plate With Receptacle:
 - 1. Equal to: "Cooper Wiring"; No. 35MR, 2-Gang.
 - 2. Color: White.

- B. 1-Gang Wall Plate Only:
 - 1. Equal to: "Cooper Wiring"; No. 35M1.
 - 2. Color: White.

- C. 2-Gang Wall Plate Only:
 - 1. Equal to: "Cooper Wiring"; No. 35M2.
 - 2. Color: White.

2.14 CABLE MANAGEMENT WALL PLATE

- A. Single-Gang:
 - 1. Equal to: "Vanco"; No. VAN-120614, Single Gang, 2 Piece Wall Plate.
 - 2. Color: White.
- B. 2-Gang:
 - 1. Equal to: "Vanco"; No. VAN-120624, Dual Gang, 2 Piece Wall Plate.
 - 2. Color: White.

2.15 RECESSED TELEVISION CONNECTION OUTLETS

- A. Recessed Wall Box With Receptacle:
 - 1. Equal to: "Arlington"; No. TVBU505, 2-Gang.
 - 2. Frame kit with full 2-gang recess area.
 - 3. 1-gang duplex receptacle and 1-gang for connections plate.
 - 4. Color: White.
 - 5. Provide connector jacks for services as indicated for each condition.

PART 3 - EXECUTION

3.01 UTP CAT CABLE INSTALLATION

- A. Install all wiring concealed in walls in conduit.
- B. Install all exposed wiring in conduit or surface raceway.
- C. Install all wiring above ceilings in open top cable hangers or cable tray.
- D. Support cable above accessible ceilings at 3 feet on center. Attach cable support to building structure.
- E. Do not untwist cable pairs more than 1/2" when terminating.
- F. All cables that do not pass Category 6 requirements shall be removed and replaced at Contractor's expense.
- G. Maximum cable length 90 meters (295 feet).
- H. Cables shall have no physical defects such as cuts, tears, or bulges in the outer jacket. Cables with defects or damaged shall be replaced at Contractor's expense.
- I. Neatly bundle and tie all cable in closets. Provide 10 feet service loop at each end of cable drop.
- J. Maintain following clearances from EMI sources:
 - 1. Power cable: 6 inches.
 - 2. Fluorescent Lights: 12 inches.
 - 3. Transformers: 36 inches.

- K. Pulling Cable:
 - 1. Do not install Category 6 cable with more than 110N (25 lbs) pull force, as specified in EIA/TIA and BICSI practices.
 - 2. Utilize appropriate cable lubricant in sufficient quantity to reduce friction to acceptable levels for:
 - a. Long pulls inside conduit.
 - b. Pulls of multiple cables into a single small bore conduit.
 - c. Conduit runs that exceed 180 degrees of accumulated bends.
 - 3. Use tensile rated cords (ie fishing line) for difficult or questionable pulls to judge whether a particular pulling situation is within the tolerances outlined.
- L. Cable jackets that are chaffed or burned exposing internal conductor insulation or have any bare copper (shiners) shall be replaced.
- M. Firestop all openings where cable is installed through a fire barrier or rated assembly.
- N. Terminate cable per EIA/TIA T568B or T568C standard pin assignments.
- O. Test, label and document per Section 17080.

3.02 INSERTS AND FACEPLATES

- A. All cables shall be terminated with high density modular jacks that snap into a faceplate mounted on a wall outlet box or surface raceway.
- B. Outlet boxes shall be secured to building with mechanical fasteners. Adhesive fasteners are not allowed.
- C. All openings not used shall be fitted with appropriate blank inserts.
- D. Test, label and document per Section 17080.

SUBMITTAL CHECKLIST

- 1. Product Data Sheets.
- 2. Test Results.

END OF SECTION 17130

SECTION 17210 – WIRELESS LOCAL AREA NETWORK

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide all labor, materials, tools, equipment, software, licenses, etc. for a complete, fully functioning wireless local area network (WLAN) system as outlined in the Contract Documents.
- B. Systems and Equipment:
 - 1. Wireless LAN Controller.
 - 2. Wireless Internet Access Points.
 - 3. Wireless Internet Software System.
- C. Provide equipment in quantity, mountings and at locations as indicated on the Drawings.
- D. Provide all technology licenses required for full use of system, software and users complete for a period of (5) years minimum.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Division 16 - Electrical.
- B. Section 17080 – Testing, Identification and Administration.
- C. Section 17110 - Equipment Rooms and Service Entrances.
- D. Section 17130 - Horizontal Cabling.

1.03 QUALITY ASSURANCE

- A. Wireless system contractor must be a certified reseller of specified product.
- B. Wireless system technicians must be a certified installer of specified product.

1.04 SUBMITTALS

- A. Manufacturer's catalog sheets and specifications for all products to be installed.
- B. Warranty information.
- C. Installer and technician certifications for selected system.
- D. Test Results and Documentation per Section 17080.

PART 2 - PRODUCTS

2.01 WIRELESS LAN CONTROLLER

- A. Acceptable Manufacturer and Equipment:
1. "Cisco Systems"; 4400 Series, #AIR-WLC4402-25-C4K CAT4K 4402-25 Bundle.
- B. Description:
1. Rack-mounted units, to be installed in server rack, 1RU.
 2. Manages all wireless access points with visibility and control of all devices.
 3. Serves up to (25) simultaneous access points.
 4. (2) 1 GB Ethernet ports.
 5. (1) expansion slot.
 6. Wireless IEEE 802.11a/b/g/d/h/n.
 7. Provide redundant power supply.

2.02 WIRELESS INTERNET ACCESS POINT (EXPOSED FINISHED CEILING TYPE)

- A. Acceptable Manufacturer and Equipment:
1. "Cisco Systems"; Aironet, #AIR-LAP1252AG-A-K9.
- B. Description:
1. Surface-mounted and exposed to view on finished solid ceiling or lay-in ceiling surfaces.
 2. Power over Ethernet (PoE).
 3. Dual-band controller-based 802.11 a/g/n.
 4. Backward compatible with 802.11 a/b/g clients.
 5. M-Drive technology optimizes RF.
 6. Plenum rated.
 7. Provide mounting brackets as required for intended installation conditions.
 8. Color: White.

2.03 WIRELESS INTERNET ACCESS POINT (EXPOSED ANTENNAE TYPE)

- A. Acceptable Manufacturer and Equipment:
1. "Cisco Systems"; Aironet, #AIR-LAP1142N-A-K9.
- B. Description:
1. Surface-mounted and exposed to view on finished ceiling, wall or structure surfaces.
 2. Access point with metal housing and pre-installed radio modules.
 3. Provide and aim external antennae as required for proper coverage and performance.
 4. Power over Ethernet (PoE).
 5. Unified AP, 6RP-TNC, 802.11 a/g/n.
 6. Backward compatible with 802.11 a/b/g clients.
 7. M-Drive technology optimizes RF.
 8. Plenum rated.
 9. Provide mounting brackets as required for intended installation conditions.
 10. Color: White.

2.04 WIRELESS INTERNET SOFTWARE SYSTEM

- A. Acceptable Manufacturer and Equipment:
 - 1. "Cisco Systems"; Unified Wireless Network Software and IOS Software.
- B. Internet-accessible system with the following requirements:
 - 1. Simultaneous complete use of all wireless access points at full capacity.
 - 2. Provide all licenses as required.
 - 3. Provide most current version of software with all latest updates, installed on LAN server.

PART 3 - EXECUTION

3.01 WIRELESS LAN CONTROLLER

- A. Install unit complete in rack per manufacturer's directions and as shown on the Drawings.
- B. Verify final rack configuration with Owner's Representative or Technology Director.
- C. Provide all rack mounting hardware.
- D. Provide connection to MDF.
- E. Fully connect to the UPS system.
- F. Test, label and document per Section 17080.

3.02 WIRELESS ACCESS POINTS

- A. Install in locations as shown on the Drawings.
- B. Verify final locations with the Owner's Representative or Technology Director.
- C. Test, label and document per Section 17080.
- D. Aim wireless access points and antennae for optimal performance. Re-aim in the field as required. Remove and reinstall as required for performance requirements as required under the direction of the Owner's Representative or Technology Director.

3.03 SERVER AND NETWORK

- A. Install all software systems complete for a fully functioning and operational wireless system.
- B. Program all devices into the system.

SUBMITTAL CHECKLIST

- 1. Product Data Sheets.
- 2. Warranty information.
- 3. Certifications.
- 4. Test Results.

END OF SECTION 17210

SECTION 17762 - CENTRAL SOUND/COMMUNICATION/PROGRAM SYSTEM

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. A complete central sound/communication/program system for the entire building.
- B. Drawings and general provisions of the Contract, General and Special Conditions and Division 1 Sections apply to this Section.

1.02 SYSTEM DESCRIPTION AND SCOPE OF WORK

- A. The work provided herein consists of furnishing and installing all equipment, cabling and labor required for a complete, operable, new computer based administrative communication and control system as shown on the plans and specifications.
- B. The system shall provide a communications path to all classrooms, workrooms, multi-purpose rooms, offices and corridor speaker locations and all exterior speaker locations. The communications path shall be separate from voice processing system allowing simultaneous use of classroom telephone and receipt of intercom pages to the speaker without interruption.
- C. Intercom system shall be interfaced to the telephone system allowing any telephone location, with the entry of a password, to initiate a page, call a specific room or zone, or initiate an emergency or time tone.
- D. The equipment specified herein and shown on the drawings is based upon equipment as manufactured by Teradon/ThreeSixty. The intent is to establish a standard of quality, function, and features. It is the responsibility of the bidder to insure that the system meets or exceeds all standards set forth in these specifications.
- E. The Contractor shall be responsible for submitting shop drawings identifying full campus speaker coverage.
- F. The Contractor shall provide all support to the District to interface the system to other communication devices.
- G. The contractor shall have a factory trained service department on call 24 hours a day, 365 days a year, to service the specified product. The systems contractor must be able to provide a reasonable response time.
- H. The contractor shall maintain adequate stock of potential replacement parts including speakers, exterior horn speakers, back boxes, grilles, remote speaker cards, and power supplies to service the system should component failure occur.

1.03 VOICE COMMUNICATIONS AND SOUND SYSTEM

- A. Furnish and install a complete computer based and controlled voice communications system with all wire, outlets, and equipment as may be required, as shown on the drawings, and as herein specified to provide a complete and operational sound and voice communications system.

- B. The Contractor shall provide the following documentation and services:
 - 1. As built drawings: These drawings shall include the manufacturer's specification sheets, including all the component parts, control equipment drawings, and wiring diagrams. They should include up-to-date drawings that include any changes made to the system during installation as well as operator's manuals and instructions.

1.04 SYSTEM DESCRIPTION

- A. The system shall consist of a central equipment cabinet, system server running computer based intercom operations software, power supply, zone cards, Executive Handsets, amplifiers, classroom loudspeaker assemblies, and all associated material, hardware, wiring, and options as described herein to provide a complete working system which shall meet the specified requirements.
- B. The system shall provide the following communication paths and functions:
 - 1. Executive control to a single classroom loudspeaker.
 - 2. Executive control to executive control.
 - 3. Executive control to classroom phone.
 - 4. Simultaneous program distribution directed from an executive control without interrupting the intercom channel.
 - 5. Executive control or classroom telephone (with pass code) to any of the system programmable 999 paging zones.
 - 6. Executive control or classroom telephone (with pass code) to any of the 999 emergency alerts in the system.
 - 7. Executive control to Teradon IP softphone from any Windows based computer
 - 8. Expandable up to 255 simultaneous intercom and 255 simultaneous paging channels
- C. The system shall provide the facilities for:
 - 1. Paging
 - 2. Sounding emergency signals
 - 3. Timed event signals
 - 4. Control and distribute multiple program channels to individual classrooms, selected groups, or all classroom speakers.
 - 5. Programmable input and output events without the need for additional hardware
- D. The system computer shall include the capabilities to act as the master clock and will be capable of correcting compatible brands of analog and digital secondary clocks. The system clock shall be capable of being automatically updated with the atomic clock on the Internet or the Districts time server via LAN or WAN connection.
- E. The system shall use standard 25-volt technology.

- F. The system shall also provide standard Telephone functions as the PBX/VOIP phone system in the school connected to external trunk lines provided by telecom provider. The system will supply the school with the following features on the telephone system:
 - a) Capability to accommodate up to 999 telephone extensions without the addition of another PBX/VOIP system. Systems that require an additional PBX/VOIP system to be tied into the intercom are not considered equal.
 - b) SIP Compliant
 - c) Caller ID
 - d) Voice mail for each user by e-mail notification when mailbox approaches maximum size.
 - e) Automated attendant
 - f) Call forwarding
 - g) Call waiting
 - h) Conference calling

- G. The system shall provide for Remote Addressable Units (RAU) connected to the Central Equipment cabinet via new copper cabling or a single pair of multimode fiber optic in a star topology. All RAU's to be located at or near IDF's. All local room wiring for speaker, call-in and VOIP or Analog Telephone should be cabled via existing or new CAT5/6 homerun to each local RAU. Must be able to accommodate RAU's in multi-building complexes with only a single connection between the head-end and the RAU. Individual homeruns to the head-end are unacceptable. Systems that require master control cards found in the head end rack to also be located in RAU's for communication are not considered equal.

1.05 SYSTEM FUNCTION

- A. The system shall provide a minimum of the following:
 - 1. Provide computer-based equipment of plug and play design, utilizing plug in connections between the system control computer and the system cards.
 - 2. Ability to interconnect multiple Raptor V Systems for global emergency communication
 - 3. Provide SIP gateway to owner furnished SIP compliant telephone systems
 - 4. Ability to perform district wide or site to site paging
 - 5. Ability to perform site to site intercom calls
 - 6. Utilize the latest in EVO technology for Video override of Teradon's Trilo digital signage solutions
 - 7. Ability to perform page, intercom, manual audio event, or music call from any Windows based computer running Teradon softphone program
 - 8. Emergency calls shall be set to take precedence over all routine calls.
 - 9. Optional iPad testing app
 - 10. Optional UPS (uninterruptible power supply) shall be provided to maintain system integrity in instances of power loss.
 - 11. Distribution of paging announcements via any Executive control handset, telephone interface, or system computer.
 - 12. System shall be capable of accommodating 999 Executive Handsets, Teradon SIP softphones, or classroom phones in any combination.
 - 13. Classroom loudspeakers are user programmable to any of 999 paging or class change zones. Systems not capable of handling a minimum of 75 zones shall not be acceptable.

14. Each Room/Call-in can be designated as either an Intercom Call-in or a Special Event function.
 - a. Call-in: Each Call-in Shall be capable of producing a 'Normal' Call-in event, an 'Emergency' Call-in event or a special event.
 - i. Special Event: Each Room/Call-in shall be capable of being redefined for a special event on Call-in. The Special event will generate any system-defined tone for the specified duration to any programmed paging zone
15. System shall be capable of utilizing standard.WAV or .mp3 files for sound generation. System shall come equipped with a minimum of 30 sound selections, including multiple bells, custodial, and emergency tones.
16. Programmable tones such as warble, siren, chime, etc shall be available. 30 different tones shall come on the system. The owner shall have the ability, without requiring a service call to the Contractor, to add unlimited additional tones or unlimited pre-recorded messages and announcements to the system.
17. The system shall be able to handle unlimited owner provided .WAV or .mp3 file imports for tones.
18. The system shall be able to provide 2 auxiliary contact closures per speaker card that are triggered on any of the following events:
 - a. Bells
 - b. All Page
 - c. Special Events
 - d. Timed Correction for external systems such as mechanical clock correction or lighting control
19. Last number redial
20. Speed dial access to specific functions.
21. User Programmable "soft-keys" to initiate action such as emergency, all-page, and bells with a single touch of a button.
22. Clear all registered calls
23. Calls shall repeat until ring count is reached for each Executive Handset.
24. The system shall come equipped with 2 Executive Handsets, with built in microphone, Caller Id, speaker, and hands free speakerphone.
25. The system shall have the following station design:
26. Each classroom shall be considered one station and shall have a dedicated audio circuit to the central equipment cabinet or RAU.
27. All outside horns shall be zoned separately.
28. Each grade level shall be independently grouped into its own zone separately.
29. All zones shall be verified with District Representatives.
30. Capability for an Executive Handset or telephone interface with the system to direct a program to any one, group of, or all remote stations.
31. Programmable system functions, including:
 - a. 4-6 digit user programmable room dialing
 - b. Caller Id to the Executive Handset, as well as classroom phones if equipped. Systems that must have separate caller ID modules will not be accepted.
 - c. Unlimited user events and user tones.
 - d. Unlimited bell schedules.
 - e. Ring up to 3 simultaneous event/bell schedules
 - f. 999 multi-purpose zones on systems installed. Systems that require multiple Master Control Units to be networked together to accomplish this number of zones are not considered equal.
 - g. Automatic distribution of user programmable time events activated by the internal clock.

- h. School programmable room stations, zones, or multiple zones to receive the program source on a selected basis. School shall be able to access the computer and assign room, zone, and events with a single point and click.
 - i. Compatible with standard Bellcore Caller Id Remote Display Units for display of incoming calls.
 - j. System is to be compatible with DTMF phone system and be able to use touch tone phones to make and receive call from within the system.
 - k. System is to have a user-programmable, UPS backed master clock.
 - l. System shall be able to drive a combination of both digital and analog clocks on the same circuit from within the system
 - m. System capacity shall be up to 4096 remote stations and call points with a minimum capacity of 2 Executive Handsets expandable up to 999.
 - n. The system must be able to accept unlimited system inputs to integrate to external special systems, which the school wishes to generate an event or tone on the intercom.
 - o. The system shall support "remote speaker cards" allowing for speaker cards/stations to be located throughout the building or buildings.
 - p. Systems that require all speakers and call switches be home run to the head-end and that do not support the placement of "remote speaker cards" are not acceptable.
- B. Remote Access and Programming
- 1. Web Interface: The system shall provide password protected web programming from any internet connection. The web interface shall include the minimum functions:
 - a. Bell Schedule creation and modification
 - b. Zone configuration and management
 - c. Extension programming
 - d. Tone Configuration
 - e. Ability to create, upload and distribute audio files a single site or to multiple systems at the same time. Audio files to include voice recording, site created or downloaded audio files.
 - f. Upload audio files or create 'on the fly' announcements
 - g. Multiple levels of access for local site level access and district wide access.
 - h. Ability to view system log files.
 - i. Systems that do not provide a constant, web based and web accessible programming option for the end user will not be accepted.
 - 2. Configuration: The system shall provide password protected Remote Configuration features via a TCP/IP network based LAN or WAN including:
 - a. Speaker card configuration
 - b. Room configurations
 - c. System Diagnostics
 - 3. Assistance: The system shall provide password protected Remote Assistance features via a TCP/IP network based LAN or WAN including:
 - a. Operating System trouble shooting/diagnostics
 - b. Database maintenance
 - c. File transfers
- C. Remote Addressable Unit (RAU)
- 1. Remote Addressable Units shall consist of:
 - a. Rack mount 120w amplifiers located in Central System Equipment
 - b. Rack Audio Bridge in 1U fully enclosed chassis located in Central System Equipment

- c. Up to 254 Speaker/Call-in Modules in 1U fully enclosed chassis located in Remote System Equipment
- d. Fiber Transmitters and Receivers (if fiber is used) or copper connections (if copper is used)
2. Remote System Equipment shall be connected in a star topology to the Head end via:
 - a. Copper: CAT6 cable; and three (3) individually shielded pair 18AWG Stranded cable - Belden 9369 or equal.
 - I. All speaker cards connected via copper must be equipped with EVO Emergency Voice override to allow for emergency paging in the event of a power failure. Part # IC1100RC
 - b. Fiber: 2 strands fiber-optic cabling between head-end and each RAU
3. Local room wiring for speaker and call-in should be cabled in CAT 6 or 18AWG stranded cable homerun to each local Remote System Equipment.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Provide systems, as approved by the Architect, from one of the following manufacturers:
 1. Teradon/ThreeSixty
 2. Rauland.
 3. Bogen
 4. Telecor
- B. Basis of Specification: “Teradon/ThreeSixty”, “Raptor V Intercom”.

2.02 SYSTEM COMPONENTS

- A. Central System Equipment
 1. Teradon AR1000 Series Raptor V intercom computer.
 2. Standard Windows 7 Embedded OS or newer computer with minimum of (2) 500G hard drive, RAID 1 configuration, Xeon processor, 2G RAM, CD-R+W with redundant power supply and Raid 1 array. Teradon Ter-Comm-4U SP02-R
 3. Amplifier: 120 Watt Modular Amplifier; provide minimum (2) amplifiers sufficient to provide 1 Watt per interior speaker and 12 Watt per exterior speaker
 4. Communication Card: Teradon IC1110R-8 Rack Mount Converter Card with 8 Ports
 5. VOX Card: Teradon IC1130R Rack Mount VOX Card
 6. 4 Channel Mixer Card: Teradon IC1150R Rack Mount 4 Channel Mixer Card
 7. Provide AM/FM tuner with exterior roof mounted antenna in remote intercom audio source. Locate where indicated on the Drawings.
 8. System shall be provided with rack mounted 15” LCD monitor, keyboard and mouse for owner use in programming changes.
 9. Rack Mounted UPS / Battery Back-up
 10. Cabinet: Teradon 6622 Stand Alone Cabinet with 22 Rack Units of Vertical Space or larger depending upon size of system.
- B. Executive Control Handset
 1. Teradon A9007 Executive Phone
 2. Color: Charcoal
 3. Locate where indicated on the Drawings.
- C. Classroom and Corridor Speakers
 1. 2 x 2 Lay in speaker for suspended ceilings: Teradon TQS12

- D. Exterior Speakers
 - 1. Speaker: Teradon A4000 Horn Speaker
 - 2. Wire Guard: Teradon A4000G Horn Speaker Wire Guard
 - 3. Back Box: Teradon A5005 Surface Back box for 8" Speaker
- E. Remote System Equipment
 - 1. Speaker Card: Teradon IC1100R Speaker Card
 - 2. Speaker Card Power Supply: Teradon IC1100PS
 - 3. Amplifier: Teradon models T-1S120 120 Watt, TA240 240 Watt per requirements
 - 4. Vox Card: Teradon IC1130R
- F. Telephone Interface Device
 - 1. Telephone Interface Device: Telephone interface to telephone system is provided in the IC2000 Audio Conference Bridge
- G. Miscellaneous
 - 1. Call-in Switch: Teradon A2001 Call-In Switch
 - 2. Executive Analog Phone: A9007
 - 3. Executive VOIP Phone: A9004
 - 4. Remote Access Software: provide the capability to install at owners request (2) copies of Remote Access Software.
 - 5. Volume Control: Provide Atlas Sound AT-10 volume control as noted on drawings.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install per manufacturers specifications.
- B. Speakers on the drawings are shown in their approximate location and for quantities needed. The Contractor shall coordinate exact locations and quantities of all clock and speaker locations with the District's Representative. Installation of all ceiling speakers shall be coordinated with these plans. In general: Corridor speakers shall be centered and spaced 20 feet apart. Classroom speakers shall be centered in the room, or centered on the wall where wall mounting is required. Gym, Media Center, Auditorium, Cafeteria, etc. speakers shall be positioned for proper sound coverage, avoiding ceiling sound panels and include appropriate protective wire guards.
- C. All rooms shall be individually zoned. Corridors shall have maximum 8 speakers per zone.

3.02 WIRING

- A. Size and quantity of conductors shall be in accordance with manufacturer's requirement for cabling. Cables may be run in conduit or in return air plenums provided the cable is UL listed for Plenum use.
- B. CAT6 stranded cabling shall be utilized for speaker, call-ins, and Executive Handsets.
- C. The number of clocks on each run and the distance for the clock runs will determine secondary clock wiring.

3.03 WARRANTY AND TRAINING

- A. The system contractor shall warrant any equipment installed under this specification to be free from defect for a period of one (1) year from the date of final acceptance.

- B. The system contractor shall provide a minimum of 2 hours training for the school district personnel on proper operating procedures for the system after completion per campus. This will include a follow up "advanced" training no later than three (3) months after initial training up to four (4) separate site visits.
 - a. Initial Training will cover use of all telephones both executive and classroom. In addition, contractor is required in initial training to provide instruction to district personnel on bell schedule, music playing, zone creation and back up procedures to ensure that the district can control their system without a service call to change bell schedules, create zones or back up any changes that they make.
- C. The system contractor shall include a full description of the proposed training program as a part of the proposal.
- D. The system contractor shall generate a list of call stations and there associated rooms to be given to the school.

END OF SECTION 17762

SECTION 17910 – CAMERA SURVEILLANCE SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide all labor, materials, tools, equipment, software, licenses, etc. for complete, fully functioning, turn-key digital video surveillance system as outlined in the Contract Documents.
- B. Systems and Equipment:
 - 1. Interior Network Security Cameras.
 - 2. Exterior Network Security Cameras.
 - 3. Video Surveillance Appliance / Security DVR.
 - 4. Video Surveillance System Server.
 - 5. Network Video Management Software.
- C. Coordinate installation and integration with following related systems:
 - 1. Electrical.
 - 2. Technology and Communications.

1.02 RELATED WORK SPECIFIED ELESWHERE

- A. Division 16 - Electrical
- B. Section 17080 - Testing
- C. Section 17100 - Telecommunications Rooms
- D. Section 17130 - Horizontal Cabling

1.03 QUALITY ASSURANCE

- A. System contractor must be certified reseller of specified product.
- B. System technicians must be certified installer of specified product.
- C. Installer must have a service facility and organization with staffing capable of providing comprehensive maintenance and service to the specified systems within 48 hours after receiving a call.

1.04 SUBMITTALS

- A. Manufacturer's catalog sheets and specifications for all products to be installed.
- B. Warranty information.
- C. Installer and technician certifications for selected system.
- D. Test Results and Documentation per Section 17080.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Rough-in components shall be delivered for timely installation without delay to other trades and project progress.
- B. All other equipment and components shall not arrive onsite until building is fully enclosed, climate conditioned, ceiling grid in place and walls finished.
- C. Protect all equipment on-site before and after installation until Owner occupancy.

1.06 OWNER TRAINING

- A. A minimum of two (2) hours training of all components, equipment, software and systems is required.
- B. Coordinate with the Owner's Technology Coordinator for all training.

PART 2 - PRODUCTS

2.01 INTERIOR CAMERAS (LAY-IN CEILING TYPE)

- A. Acceptable Manufacturer and Equipment:
 - 1. "Axis Communications"; Axis M30 Network Camera Series, #M3014.
 - 2. "Avigilon"
- B. Description:
 - 1. Recessed ceiling mount within lay-in acoustical ceiling system. Integral ceiling mounting system. Mounting trims, accessories, connector kit as required.
 - 2. Fixed dome.
 - 3. Power Over Ethernet (POE).
 - 4. 1 megapixel lens.
 - 5. 2.9mm lens, F2 O fixed iris.
 - 6. 720p HDTV display.
 - 7. Camera angle adjustment; Digital PTZ (Pan, Tilt, Zoom) preset positions, guard tour.
 - 8. 30 fps frame rate.
 - 9. Video motion detection and sensing activation.
 - 10. Multiple H.264 streams and Motion JPEG video streams.
 - 11. White plastic casing and White cover ring.
 - 12. Clear polycarbonate transparent cover.

2.02 INTERIOR CAMERAS (LAY-IN CEILING TYPE – POINT OF ENTRY)

- A. Acceptable Manufacturer and Equipment:
 - 1. "Axis Communications"; Axis P33 Network Camera Series, #P3364-V.
 - 2. "Avigilon"
- B. Description:
 - 1. Recessed ceiling mount within lay-in acoustical ceiling system. "Axis" #IP51-rated drop-ceiling mount kit. Mounting trims, accessories, connector kit as required.
 - 2. Fixed dome with vandal resistant housing.
 - 3. Power Over Ethernet (POE).
 - 4. 1 megapixel lens.
 - 5. Varifocal lens with remote zoom and focus, IR corrected, megapixel resolution, 2.5 - 6mm lens, DC iris.
 - 6. 720p HDTV display.
 - 7. Automatically removable infrared-cut filter, day and night.
 - 8. Camera angle adjustment; Pan 360 degrees, Tilt 170 degrees, Rotation 340 degrees.
 - 9. 30 fps frame rate.
 - 10. 2-way audio with built-in microphone and audio detection.
 - 11. Video motion detection and sensing activation.
 - 12. SD/SDHC memory card slot for local storage. Memory card provided by Owner if desired.
 - 13. Multiple H.264 streams and Motion JPEG video streams.
 - 14. White impact-resistant aluminum casing.
 - 15. Smoked polycarbonate transparent cover.

2.03 INTERIOR CAMERAS (SURFACE-MOUNT TYPE)

A. Acceptable Manufacturer and Equipment:

1. "Axis Communications"; Axis P33 Network Camera Series, #P3364-V.
2. "Avigilon"

B. Description:

1. Same camera as specified for "Interior Cameras (Lay-In Ceiling Type – Point Of Entry)" except:
Surface-mount on wall surface.
Surface mounting bracket. Mounting trims, accessories, connector kit as required.

2.04 EXTERIOR CAMERAS (SURFACE-MOUNT TYPE)

A. Acceptable Manufacturer and Equipment:

1. "Axis Communications"; Axis P33 Network Camera Series, #P3346-VE.
2. "Avigilon"

B. Description:

1. Surface-mount on wall surface.
Surface mounting bracket. Mounting trims, accessories, connector kit, weather shield, cable shield, gasketing as required.
2. Fixed dome with vandal resistant housing, rated for exterior use.
3. Power Over Ethernet (POE).
4. 3 megapixel lens.
5. Varifocal lens with remote zoom and focus, IR corrected, megapixel resolution, 3 - 9mm lens, P iris.
6. 1080p HDTV display.
7. Automatically removable infrared-cut filter, day and night.
8. Camera angle adjustment; Pan 360 degrees, Tilt 160 degrees, Rotation 340 degrees.
9. 20 fps frame rate.
10. 2-way audio with built-in microphone and audio detection.
11. Video motion detection and sensing activation.
12. SD/SDHC memory card slot for local storage. Memory card provided by Owner if desired.
13. Multiple H.264 streams and Motion JPEG video streams.
14. White impact-resistant aluminum casing with integrated dehumidifying membrane.
15. Smoked polycarbonate transparent cover.
16. Window heater.

2.05 EXTERIOR CAMERAS (POST-MOUNT TYPE)

A. Acceptable Manufacturer and Equipment:

1. "Axis Communications"; Axis P33 Network Camera Series, #P3346-VE.
2. "Avigilon"

B. Description:

1. Same camera as specified for "Exterior Cameras (Surface-Mount Type)" except:
Post-mount on wall surface, site light pole or post.
Wall or corner mounting bracket as applicable. Pendant mount with adapter and post.
Mounting trims, accessories, connector kit, weather shield, cable shield, gasketing as required.

2.06 VIDEO SURVEILLANCE APPLIANCE / SECURITY DVR

A. See Section 17100 – Telecommunication Rooms.

2.07 VIDEO SURVEILLANCE SYSTEM SERVER

A. See Section 17100 – Telecommunication Rooms.

2.08 NETWORK VIDEO MANAGEMENT SOFTWARE

- A. Acceptable Manufacturers:
 - 1. "Avigilon".

- B. Description:
 - 1. Internet accessible IP-surveillance software.
 - 2. Unlimited concurrent users.
 - 3. Live view of all cameras.
 - 4. By the minute motion activity timeline.
 - 5. Search video based on camera, date and time.
 - 6. Search video based on non-motion events.
 - 7. Control playback speed and direction.
 - 8. Configurable motion detection criteria.
 - 9. Megapixel camera support.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All installations shall be in accordance with manufacturer's specifications and published recommendations.

- B. Focus and aim all interior and exterior units (pan, tilt, rotation, zoom, focus) as coordinated with Owner personnel present and to their satisfaction. Re-aim as required for desired security coverage.

- C. Where cameras are installed within existing lay-in acoustical ceiling systems, remove tile as required for installation of unit within tile and to provide access to wiring above ceiling. Neatly cut hole through ceiling tile to install camera tight and secure to ceiling system. Wire complete. Reinstall ceiling tile. Replace any ceiling tiles damaged by construction activities with new to match existing ceiling system.

- D. Install server system complete with all connections for a complete and fully functioning system.

- E. Install software and complete setup with Owner's Technology Coordinator.

3.02 SYSTEM ACCEPTANCE

- A. An authorized representative of the Owner along with Architect shall review all video surveillance components to assure they are properly installed and functional.

SUBMITTAL CHECKLIST

- 1. Product Data Sheets.
- 2. Warranty information.
- 3. Certifications.
- 4. Test Results.

END OF SECTION 17410

SECTION 17920 – ACCESS CONTROL SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide all labor, materials, tools, equipment, software, licenses, etc. for a complete, fully functioning, turn-key access control system as outlined in the Contract Documents.
- B. Equipment must be compatible with Owner's existing software system.
- C. Systems and Equipment:
 - 1. Multi-Technology Credential Readers.
 - 2. Remote Entry and Camera System.
 - 3. Control Wiring.
 - 4. Access Control Network Appliances.
 - 5. Access Control Door Controllers.
 - 6. Controllers.
 - 7. Sub-Controller Reader Modules.
- D. Coordinate installation and integration with all other technology systems, electrical and door hardware.
- E. See Door Access Riser Diagrams on Drawings.

1.02 RELATED WORK SPECIFIED ELESWHERE

- A. Division 16 - Electrical
- B. Section 08710 - Finish Hardware
- C. Section 17080 - Testing, Identification and Administration
- D. Section 17100 - Telecommunications Room
- E. Section 17130 - Horizontal Cabling

1.03 QUALITY ASSURANCE

- A. System contractor must be a certified reseller of specified product.
- B. System technicians must be a certified installer of specified product.
- C. Installer must have a service facility and organization with staffing capable of providing comprehensive maintenance and service to the specified systems within 48 hours after receiving a call.

1.04 SUBMITTALS

- A. Manufacturer's catalog sheets and specifications for all products to be installed.
- B. Warranty information.
- C. Installer and technician certifications for selected system.
- D. Test Results and Documentation per Section 17080.
- E. Door Access Riser Diagrams, noting any alterations required for the selected equipment to be installed.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Rough-in components shall be delivered for timely installation without delay to other trades and project progress.
- B. All other equipment and components shall not arrive onsite until building is fully enclosed, climate conditioned, ceiling grid in place and walls finished.
- C. Protect all equipment on-site before and after installation until Owner occupancy.

1.06 OWNER TRAINING

- A. A minimum of 2 hours training of all components is required with selected Owner's representative(s).

PART 2 - PRODUCTS

2.01 MULTI-TECHNOLOGY CREDENTIAL READERS (WALL MOUNT TYPE)

- A. Acceptable Manufacturers and Equipment:
 - 1. "aptiQ"; MT15.
 - 2. "Keyscan"
- B. Description:
 - 1. Capable of reading both proximity card and smart card type credentials.
 - 2. Single-gang wall-mount reader for installation on wall surface location.
 - 3. Read range up to 5 inches for proximity cards and 4 inches for smart cards.
 - 4. Tri-state LED (red, green, amber).
 - 5. Visual indicator and audio feedback representing status and activity information.
 - 6. Weatherproof for exterior installation.
 - 7. Color: Black.
 - 8. Provide electrical backbox.

2.02 MULTI-TECHNOLOGY CREDENTIAL READERS (DOOR FRAME TYPE)

- A. Acceptable Manufacturers and Equipment:
 - 1. "aptiQ"; MT 11.
 - 2. "Keyscan"
- B. Description:
 - 1. Capable of reading both proximity card and smart card type credentials.
 - 2. Mullion reader for installation on door frame, storefront frame, or mullion location.
 - 3. Read range up to 5 inches for proximity cards and 4 inches for smart cards.
 - 4. Tri-state LED (red, green, amber).
 - 5. Visual indicator and audio feedback representing status and activity information.
 - 6. Weatherproof for exterior installation.
 - 7. Color: Black.
 - 8. Provide electrical backbox.

2.03 REMOTE ENTRY AND CAMERA SYSTEM

- A. Acceptable Manufacturers and Equipment:
 - 1. "Aiphone"; JO Series.
- B. Video Door Station:
 - 1. "Aiphone"; JO-DV.
 - 2. Aluminum die cast, surface mount unit.
 - 3. Integral call button to initiate audio and video communication to the Video Intercom Station.

4. Integral color camera for 1-way video communication.
5. Integral microphone and speaker for 2-way audio communication.
6. Integral white LED illuminator, 5 lux minimum, and illumination sensor for low light conditions.
7. Integral backlit directory card with text stating "All Visitors - Please Press Call Button".
8. Locate at exterior/entry side of door.
9. Provide electrical backbox.

C. Video Intercom Station – Master Station:

1. "Aiphone"; JO-1MD.
2. ABS white resin housing, free-standing or surface-mount unit.
3. 2-way audio and 1-way video communication to the Video Door Station.
4. Remote entry control to actuate electrified door hardware, unlock door, and allow for visitor entry.
5. Electrostatic touch control buttons on face of housing.
6. Supports both PTT (Press-To-Talk, Release-To-Listen) or VOX hands-free (Auto Voice Actuation) communication capability.
7. Integral 7" color LCD video screen. Displays camera image from the Video Door Station.
8. Integral microphone and speaker.
9. Integral status LED light to monitor operation status and power of the Video Intercom Station.
10. Integral volume control button to adjust communication volume in and out.
11. Integral monitor button to activate and view the Video Door Station camera at any time.
12. Integral screen brightness control button to adjust LED screen.
13. Integral talk control button to start or end communications.
14. Integral door release button to unlock remote entry door.
15. Integral option button to activate or trigger a compatible external device.
16. Provide "Aiphone" PS-1820UL power supply.
17. Provide "Aiphone" PT-1210N transformer to electrified door hardware as required.
18. Provide "Aiphone" MCW-S/A, inside station desk stand (where to be installed on desktop).
19. Provide electrical backbox (where to be installed as wall-mounted).

D. Video Intercom Station – Add-On Station:

1. "Aiphone"; JO-1FD.
2. Same as master station unit.
3. Provides extension of system capability and control to an additional remote location.

2.07 CONTROL WIRING

- A. See Specification 17130 – Horizontal Cabling.

2.08 ACCESS CONTROL NETWORK APPLIANCES

- A. Acceptable Manufacturers and Equipment:

1. "Keyscan"

B. Description:

1. Network-ready access control appliance unit.
2. Provide intelligent support for network door controllers, sub-controllers and readers.
3. Provides intelligent support for up to (32) 2-door controller units, total of (64) individual doors.
4. Rack-mounted unit, to be installed in designated server rack, 1RU.
5. Connect to network via standard Ethernet jack.
6. Communicate system activity in real time over the network to be recorded and displayed by the Access Control System Software.
7. Onboard RAM memory, 15 MB minimum.
8. Provide with backup battery.

2.09 ACCESS CONTROL DOOR CONTROLLERS

- A. Acceptable Manufacturers and Equipment:
1. "Keyscan"
- B. Description:
1. Pre-manufactured, factory-assembled, pre-wired unit.
 2. 16"x20" metal enclosure with removable cover, conduit knockouts and mounting holes.
 3. Project may require multiple separate enclosures and power distribution boards as required for varying power outputs for both 12v and 24v to serve all the selected equipment.
 4. To include all types and quantities of all items required to operate the door(s) and equipment served to function as intended per the Drawings and riser diagrams.
Contractor to verify all requirements and include all required items within enclosure.
- C. Shall Contain:
1. Power Supply.
 2. Power Distribution Board.
 3. Self-contained Transformer.
 4. Tamper Switch.
 5. Battery Backup with built-in charger.
 6. Controllers.
 7. Sub-Controller Reader Modules.

2.10 CONTROLLERS (WITHIN ACCESS CONTROL PANELS)

- A. Acceptable Manufacturers and Equipment:
1. "Keyscan"
- B. Description:
1. To be included within factory-assembled Access Control Panels.
 2. 2-door controller unit.
 3. IP-ready intelligent controller with a built-in reader interface module allowing control of doors and access control components.
 4. Shall connect directly to the local area network and Access Control System Software.

2.11 SUB-CONTROLLER READER MODULES (WITHIN ACCESS CONTROL PANELS)

- A. Acceptable Manufacturers and Equipment:
1. "Keyscan"
- B. Description:
1. To be included within factory-assembled Access Control Panels.
 2. Dual reader unit.
 3. Provides interface between door devices and the Controller.
 4. Support for proximity readers, keypad readers, magnetic stripe Weigand and EIA-485.
 5. 8 programmable inputs.
 6. 6 relay outputs.
 7. Stores up to 8 facility codes for offline access decisions.

2.12 ACCESS CONTROL SYSTEM SOFTWARE

- A. By Owner (O.F.O.I.).
- B. Description:
1. Most current version of software with all latest updates, installed on LAN server.
 2. Includes all licenses as required for all users and devices.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All installations shall be in accordance with manufacturer's specifications and published recommendations.
- B. All systems shall function as intended and as shown or indicated on the drawings and riser diagrams.

3.02 SYSTEM ACCEPTANCE

- A. An authorized representative of the Owner along with the Architect shall review all access control components to assure they are properly installed and functional.

SUBMITTAL CHECKLIST

- 1. Product Data Sheets.
- 2. Warranty information.
- 3. Certifications.
- 4. Test Results.
- 5. Door Access Riser Diagrams.

END OF SECTION 17410

SECTION 17925 – BUILDING ALARM SECURITY SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide all labor, materials, tools, equipment, software, licenses, etc. for a complete, fully functioning, turn-key building security system as outlined in the Contract Documents.
- B. Systems and Equipment:
- C. Keypad Arm/Disarm Stations
 - 1. Interior Motion Sensors
 - 2. Audible Alarm
 - 3. System Wiring.
 - 4. Security System Network Appliances.
 - 5. Interface with Access Control Door Position Indicator Switches.
- D. Coordinate installation and integration with all other technology systems, electrical and door hardware.

1.02 RELATED WORK SPECIFIED ELESWHERE

- A. Division 16 - Electrical
- B. Section 08710 - Finish Hardware
- C. Section 17080 - Testing, Identification and Administration
- D. Section 17100 - Telecommunications Room
- E. Section 17130 - Horizontal Cabling

1.03 QUALITY ASSURANCE

- A. System contractor must be a certified reseller of specified product.
- B. System technicians must be a certified installer of specified product.
- C. Installer must have a service facility and organization with staffing capable of providing comprehensive maintenance and service to the specified systems within 24 hours after receiving a call.

1.04 SUBMITTALS

- A. Manufacturer's catalog sheets and specifications for all products to be installed.
- B. Warranty information.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Rough-in components shall be delivered for timely installation without delay to other trades and project progress.
- B. All other equipment and components shall not arrive onsite until building is fully enclosed, climate conditioned, ceiling grid in place and walls finished.
- C. Protect all equipment on-site before and after installation until Owner occupancy.

PART 2 - PRODUCTS

2.01 KEYPAD ARM/DISARM STATION

A. Description:

1. Programmable keypad device
2. Single-gang wall-mount for installation on wall surface location.
3. Visual indicator and audio feedback representing status and activity information.
4. Interior installation
5. Color: White.
6. Provide electrical back box.

2.02 INTERIOR MOTION SENSOR

A. Description:

1. Motion and infrared sensor
2. Wall or ceiling mount as appropriate for applicable location
3. Visual indicator of sensor reading
4. Interior installation.
5. Color: White.
6. Provide electrical back box where applicable

2.03 AUDIBLE ALARM

A. Description:

1. High decibel alarm(s) capable of being heard throughout the building
2. Wall or ceiling mount
3. Interior installation.
4. Color: White.
5. Provide electrical back box where applicable

2.04 CONTROL WIRING

- A. See Specification 17130 – Horizontal Cabling.

2.05 SECURITY SYSTEM NETWORK APPLIANCES

A. Description:

1. Network-ready security system appliance unit.
2. Provide intelligent support for keypad, sensors and door position switches.
3. Alarm notification capability to monitoring service via land line and cellular.
4. Provide with backup battery.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All installations shall be in accordance with manufacturer's specifications and published recommendations.
- B. All systems shall function as intended and as shown or indicated on the drawings.

3.02 SYSTEM ACCEPTANCE

- A. An authorized representative of the Owner along with the Architect shall review all building security components to assure they are properly installed and functional.

END OF SECTION 17925