

**PROJECT MANUAL**  
FOR CONSTRUCTION OF

# **CLARKSVILLE FACILITY**

## **2018 RENOVATIONS AND IMPROVEMENTS**

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**PROJECT MANUAL**  
FOR CONSTRUCTION OF

**CLARKSVILLE FACILITY**  
**2018 RENOVATIONS AND IMPROVEMENTS**

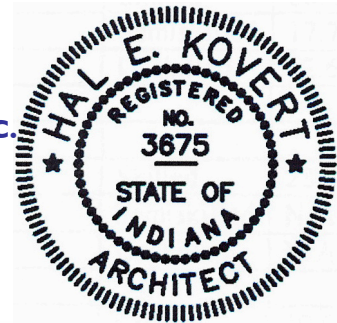
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A handwritten signature in blue ink, appearing to read 'Hal E. Kovert', written over a light blue background.

Date: December 7, 2017  
File: 201723.02

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Hal E. Kovert, AIA  
State Registration Number 3675

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SECTION 00100 - NOTICE TO BIDDERS

Notice is hereby given that sealed proposals will be received:

BY: Jeffersonville Township Public Library  
211 East Court Avenue  
Jeffersonville, IN 47130

FOR: 2018 Renovation and Improvements  
Clarksville Facility  
1312 Eastern Boulevard  
Clarksville, IN 47129

AT: Jeffersonville Township Public Library  
211 East Court Avenue  
Jeffersonville, IN 47130

UNTIL: 2:00 PM (EST), (project local time)

DATE: Tuesday, January 9, 2018

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:

Jeffersonville Township Public Library  
211 East Court Avenue  
Jeffersonville, IN 47130  
812.285.5630

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

**PRE-BID CONFERENCE**

DATE: Wednesday, January 3, 2018 at 10AM

TIME: 10:00 AM Project Local Time

LOCATION: Clarksville Facility, 1312 Eastern Boulevard Clarksville, IN 47129

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](http://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](http://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  
502-634-5771 f

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:

**Amanda M. Hunsucker, NCIDQ, IIDA, KYCID, RID**  
Koverth Hawkins Architects, Inc.  
amanda.hunsucker@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.

Jeffersonville Township Public Library  
December 7, 2017

END OF SECTION 00100





# AIA<sup>®</sup> Document A701<sup>™</sup> – 1997

## Instructions to Bidders

### for the following PROJECT:

*(Name and location or address)*

Clarksville Facility - 2018 Renovations and Improvements  
1312 Eastern Boulevard  
Clarksville, IN 47129

### THE OWNER:

*(Name, legal status and address)*

Jeffersonville Township Public Library  
211 East Court Avenue  
Jeffersonville, IN 47130

### THE ARCHITECT:

*(Name, legal status and address)*

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

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### ADDITIONS AND DELETIONS:

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

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

## **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 via the Architect’s website as identified in the Notice To Bidders. Any/all desired printing of bid documents, including all costs associated therewith, is to be borne by the bidders. 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.
- 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 2013), 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 Bidders are required to include a copy of their Indiana Certificate of Qualification for Construction Services for Public Works Projects.
- 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.

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 00220 – CONTRACTOR'S BID SUBMITTAL CHECKLIST

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Section Includes:
1. Submittals required at time of bid.
  2. Submittals required following bid.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

Section 00100 - Notice to Bidders  
AIA A701 - Instructions to Bidders  
Section 00210 - Supplementary Instructions to Bidders  
Section 00410 - Bid Security Form  
Section 00430 - Subcontractor List  
Section 00600 - Contractor's Bond for Construction  
Section 00670 - Escrow Agreement  
Section 01370 - Schedule of Values  
Proposal Form

1.03 BID SUBMITTALS

- A. The following items are to be submitted by all bidders for all contracts at the time of bidding:
- 1. Proposal Form Parts I and II**
  - 2. Bid Security**
  - 3. Financial Statement (as required by Proposal Form)**
- B. Submit **two** copies (one signed original and one copy) of above information.

1.04 POST-BID SUBMITTALS

- A. The following items are to be submitted by each successful bidder for all contracts within Twenty-Four (24) hours following the time of bidding:
- 1. Schedule of Values**
  - 2. Subcontractor List**
- B. The following items are to be submitted prior to execution of the Owner-Contractor Agreement:
- 1. Performance Bond**
  - 2. Labor & Material Payment Bond**
  - 3. Certificate of Insurance**
  - 4. Indiana Certificate of Qualification for Public Works Projects**
  - 5. Signed Escrow Agreement**
  - 6. Employee Background Check**  
(per Section 00810-Supplementary General Conditions, Article 13)
  - 7. Employee Drug and Alcohol Testing**  
(per Section 00810-Supplementary General Conditions, Article 13)
  - 8. Employment Eligibility Verification**  
(per Section 00810-Supplementary General Conditions, Article 13)
- C. Submit all above items to Architect for review and approval.

END OF SECTION 00220

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:     *2018 Renovations and Improvements*  
  *Clarksville Facility*  
  *1312 Eastern Boulevard*  
  *Clarksville, IN 47129*

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

Date (Month, Day, Year): \_\_\_\_\_

Governmental Unit (Owner):     *JEFFERSONVILLE TOWNSHIP PUBLIC LIBRARY*

County: \_\_\_\_\_

Bidder (Firm): \_\_\_\_\_

Address: \_\_\_\_\_

City, State, Zip: \_\_\_\_\_

Telephone No.: \_\_\_\_\_

Fax No.: \_\_\_\_\_

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 JEFFERSONVILLE TOWNSHIP PUBLIC LIBRARY (Governmental Unit) in accordance with plans and specifications prepared by Kovert Hawkins Architects, Inc. and their consultants 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. 1: *IRRIGATION SYSTEM* \$ \_\_\_\_\_  
Alternate No. 2: *REFINISHING OF EXTEIOR INSULATION AND FINISH SYSTEM* \$ \_\_\_\_\_  
Alternate No. 3a: *LANDSCAPING IN RAIN GARDEN AREA* \$ \_\_\_\_\_  
Alternate No. 3b: *LANDSCAPING IN COURTYARD AREA* \$ \_\_\_\_\_  
Alternate No. 4: *FAMILY RESTROOM 122* \$ \_\_\_\_\_  
Alternate No. 5: *EXISTING RESTROOM 119 IMPROVEMENTS* \$ \_\_\_\_\_  
Alternate No. 6: *NEW ROOF SCUTTLE AND ASSOCIATED LADDERS* \$ \_\_\_\_\_  
Alternate No. 7: *OWNER VACATES PREMISES DURING CONSTRUCTION* \$ \_\_\_\_\_  
Alternate No. 8a: *RTU-3 MULTIZONE* \$ \_\_\_\_\_  
Alternate No. 8b: *RTU-2 AND VAV BOXES* \$ \_\_\_\_\_  
Alternate No. 8c: *RTU-3 AND VAV BOXES* \$ \_\_\_\_\_

ALLOWANCES

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

<b>Cash Allowance (Furniture &amp; Shelving)</b> within the Base Bid per Section 01210:	<b>\$ 175,000.00</b>	initials _____
<b>Brick Allowance</b> within the Base Bid per Section 01210	<b>\$800</b> per 1000	initials _____
<b>Contingency Allowance</b> within the <b>Base Bid</b> per Section 01220	<b>\$ 100,000.00</b>	initials _____

COMPLETION OF WORK

**Base Bid:** Undersigned guarantees, if awarded contract, to complete the work within \_\_\_\_\_ ( ) calendar days.

**If Alternate No. 7 is Accepted:** Undersigned guarantees, if awarded contract, to complete the work within \_\_\_\_\_ ( ) calendar days.

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 2013)

**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:     JEFFERSONVILLE TOWNSHIP PUBLIC LIBRARY

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.

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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.

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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.

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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.

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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.

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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 00305 – INDIANA CERTIFICATE OF QUALIFICATIONS FOR PUBLIC WORKS PROJECTS

1.01 PROJECT MANUAL

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

1.02 SCOPE

- A. All contractors shall have Indiana Certificate of Qualification for Public Works Projects per Indiana Code IC 5-16-13 prior to beginning construction on site.
- B. Tier 1 contractor(s) shall be certified prior to final execution of the Owner/Contractor Agreement.
- C. A “contractor” requiring certification generally refers to a contractor in any contractor tier.
1. “Tier 1 contractor” has a direct contract with the government agency (Owner). This is also known as the “prime contractor” or “general contractor”.
  2. “Tier 2 contractor” has a direct contract with a Tier 1 contractor. This is also known as a subcontractor.
  3. “Tier 3 contractor” has a direct contract with a Tier 2 contractor. This is also known as a sub-subcontractor.
  4. “Lower tier contractor” has a direct contract with a Tier 3 contractor or lower tier contractor
  5. A supplier or firm not performing any work on site is not required to be qualified.
- D. A contractor of any tier is EXEMPT from requirements of this section if the total amount of their work awarded is less than Three Hundred Thousand dollars (\$300,000).

1.03 TIER 1 CONTRACTOR

- A. Must contribute a minimum of 15% of the initial contract amount by any combination of items 1, 2 or 3 listed below:
1. Work performed directly by Tier 1 contractor’s employees
  2. Materials supplied directly by Tier 1 contractor
  3. Services supplied directly by the Tier 1 contractor’s employees

1.04 INSURANCE REQUIREMENTS

- A. Minimum requirements for each individual or firm in any contractor tier:
- B. See Supplementary General Conditions, Section 00810, Article 11

1.05 DRUG TESTING

- A. Per Indiana Code, IC-4-13-18
1. Required of all contractors, regardless of tier.
  2. Written plan for employee drug testing program that complies with IC-4-13-18

1.06 EMPLOYEE VERIFICATION

- A. Per Indiana Code, IC-22-5-1.7-3
1. Required of all contractors, regardless of tier.
  2. Participate in the E-Verify Program

1.07 APPRENTICESHIP & TRAINING PROGRAM

- A. Per Indiana Code, IC-5-16-13-12
  
- B. Contractors with 10 or more employees
  - 1. Provide access to training program applicable to tasks performed in normal course of employment.
  - 2. Compliance may be accomplished through any of the following:
    - a. Apprenticeship program
    - b. Programs offered by Ivy Tech Community College of Indiana
    - c. Programs offered by Vincennes University
    - d. Programs established by or for the contractor
    - e. Programs offered by an entity sponsored by the US Dept of Labor
    - f. Programs that results in the award of industry recognized portable certification
    - g. Programs approved by US Dept of Transportation or INDOT.
  
- C. Tier 1 and tier 2 contractors with 50 or more employees
  - 1. Must participate in an apprenticeship or training program which meets the standards of any of the following:
    - a. The US Department of Labor, Bureau of Apprenticeship and Training
    - b. The Indiana Department of Labor
    - c. The US Department of Transportation, Federal Highway Administration
    - d. INDOT

1.08 RECORDS

- A. Per Indiana Code, IC-5-16-13-13
  
- B. Payroll and related records of a contractor in any contractor tier must be:
  - 1. Preserved by the contractor for a period of three (3) years after completion
  - 2. Open to inspection by the department of workforce development

END OF SECTION 00305

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.

D. Refer to Section 00220 - Contractor's Bid Submittal Checklist for requirements as to time of submission.

END OF SECTION 00410



# AIA® Document A310™ – 2010

## Bid Bond

**CONTRACTOR:**

*(Name, legal status and address)*

**SURETY:**

*(Name, legal status and principal place of business)*

**OWNER:**

*(Name, legal status and address)*

Jeffersonville Township Public Library  
211 East Court Avenue  
Jeffersonville, IN 47130

**BOND AMOUNT: \$****PROJECT:**

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

Clarksville Facility - 2018 Renovations and Improvements  
1312 Eastern Boulevard  
Clarksville, IN 47129

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.

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User Notes:

(3B9ADA27)

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)*

\_\_\_\_\_ *(Title)*

\_\_\_\_\_ *(Witness)*

\_\_\_\_\_ *(Surety)* \_\_\_\_\_ *(Seal)*

\_\_\_\_\_ *(Title)*

\_\_\_\_\_ *(Witness)*



Init.



SECTION 00430 - SUBCONTRACTOR LIST

1.01 PROJECT MANUAL

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

1.02 SCOPE

- A. Successful Bidder for each Contract shall submit his complete Subcontractors List for all trades and divisions of work.
- B. After submission of this List and after approval by the Architect/Engineer and Owner, it shall not be changed without written approval by the Owner and Architect/Engineer.
- C. Refer to Section 00220 – Contractor's Bid Submittal Checklist for requirements as to time of submission.

1.03 FORM

Provide in Contractor's own format to include the following information:

- A. Description of work or trade.
- B. Company Name.
- C. Company Address.
- D. Company Phone and Fax.
- E. Contact Person.
- F. E-mail Address.
- G. MBE/WBE Status.

END OF SECTION 00430

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    day of    in the year  
*(In words, indicate day, month and year.)*

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

Jeffersonville Township Public Library  
211 East Court Avenue  
Jeffersonville, IN 47130

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

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

Clarksville Facility - 2018 Renovations and Improvements  
1312 Eastern Boulevard  
Clarksville, IN 47129

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.

Int.

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## 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.)*

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**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 (\$ ), 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

Init.

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:

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**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)*

**§ 8.4** The Contractor’s representative:  
*(Name, address and other information)*

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§ 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.



**.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)*

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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

# AIA<sup>®</sup> Document A312<sup>™</sup> – 2010

## Performance Bond

**CONTRACTOR:**

(Name, legal status and address)

**SURETY:**

(Name, legal status and principal place of business)

**OWNER:**

(Name, legal status and address)

Jeffersonville Township Public Library  
211 East Court Avenue  
Jeffersonville, IN 47130

**CONSTRUCTION CONTRACT**

Date:

Amount: \$

Description:

(Name and location)

Clarksville Facility - 2018 Renovations and Improvements  
1312 Eastern Boulevard  
Clarksville, IN 47129

**BOND**

Date:

(Not earlier than Construction Contract Date)

Amount: \$

Modifications to this Bond:                      None                      See Section 16

**CONTRACTOR AS PRINCIPAL**

Company:                      (Corporate Seal)

Signature: \_\_\_\_\_

Name and

Title:

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

**SURETY**

Company:                      (Corporate Seal)

Signature: \_\_\_\_\_

Name and

Title:

(FOR INFORMATION ONLY — Name, address and telephone)

**AGENT or BROKER:**

**OWNER'S REPRESENTATIVE:**

(Architect, Engineer or other party:)

**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.

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**§ 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.

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**§ 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.

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§ 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: \_\_\_\_\_  
Signature: \_\_\_\_\_  
*(Corporate Seal)*

**SURETY**

Company: \_\_\_\_\_  
Signature: \_\_\_\_\_  
*(Corporate Seal)*

Name and Title: \_\_\_\_\_  
Address: \_\_\_\_\_

Name and Title: \_\_\_\_\_  
Address: \_\_\_\_\_

## Payment Bond

**CONTRACTOR:**
*(Name, legal status and address)*
**SURETY:**
*(Name, legal status and principal place of business)*
**OWNER:**
*(Name, legal status and address)*

Jeffersonville Township Public Library  
211 East Court Avenue  
Jeffersonville, IN 47130

**CONSTRUCTION CONTRACT**
**Date:**
**Amount: \$**
**Description:**
*(Name and location)*

Clarksville Facility - 2018 Renovations and Improvements  
1312 Eastern Boulevard  
Clarksville, IN 47129

**BOND**
**Date:**
*(Not earlier than Construction Contract Date)*
**Amount: \$**
**Modifications to this Bond:**

None

See Section 18

**CONTRACTOR AS PRINCIPAL**
**Company:**
*(Corporate Seal)*
**Signature:**
**SURETY**
**Company:**
*(Corporate Seal)*
**Signature:**
**Name and**
**Title:**
*(Any additional signatures appear on the last page of this Payment Bond.)*
**Name and**
**Title:**
*(FOR INFORMATION ONLY — Name, address and telephone)*
**AGENT or BROKER:**
**OWNER'S REPRESENTATIVE:**
*(Architect, Engineer or other party:)*
**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.

**§ 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.

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**§ 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.

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**§ 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: \_\_\_\_\_  
Signature: \_\_\_\_\_  
*(Corporate Seal)*

**SURETY**

Company: \_\_\_\_\_  
Signature: \_\_\_\_\_  
*(Corporate Seal)*

Name and Title: \_\_\_\_\_  
Address: \_\_\_\_\_

Name and Title: \_\_\_\_\_  
Address: \_\_\_\_\_

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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<sup>®</sup> Document A201<sup>™</sup> – 2007

## General Conditions of the Contract for Construction

### for the following PROJECT:

*(Name and location or address)*

Clarksville Facility - 2018 Renovations and Improvements  
1312 Eastern Boulevard  
Clarksville, IN 47129

### THE OWNER:

*(Name, legal status and address)*

Jeffersonville Township Public Library  
211 East Court Avenue  
Jeffersonville, IN 47130

### THE ARCHITECT:

*(Name, legal status and address)*

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

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- 14 TERMINATION OR SUSPENSION OF THE CONTRACT
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### ADDITIONS AND DELETIONS:

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

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

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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

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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



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.

#### **§ 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.

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§ 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

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

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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.

## **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;

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- .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 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

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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

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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
- .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.

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§ 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 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.

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**§ 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 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

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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

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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.

**§ 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

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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.

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

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

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

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, 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.

§ 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.

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## § 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;

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- .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.

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**§ 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.

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#### **§ 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.

**§ 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.

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§ 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

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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.



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**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 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 MANAGER**

**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 or 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 "Hindrances" 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 Hindrance 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 Hindrance. 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 Hindrance 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 Hindrance 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 Hindrance 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  
\$2,000,000 - annual aggregate.
  - b. Property Damage:  
\$1,000,000 - each occurrence.  
\$2,000,000 - 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:  
\$2,000,000 each occurrence
  - b. Property Damage:  
\$1,000,000 each occurrence  
\$2,000,000 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.

13.9 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. Partial occupancy of completed work.
  - 6. Temporary exiting.
  - 7. 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. Move any stored products that interfere with operations of Owner or other Contractor.
  - 2. Obtain and pay for use of additional storage or work areas needed for operations.
  - 3. Available space for construction field offices and storage sheds is limited to the project site.  
Contractor must arrange for off site storage as required.
- 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.
  - 4. Coordinate all operations with the Architect and Owner. Complete in the minimum amount of time.
- C. Protection:
  - 1. Do not close or obstruct streets, entrance drives, sidewalks or other facilities without permission of the Owner and local authorities.
  - 2. Conduct operations with minimum interference.
  - 3. Furnish, erect and maintain barricades, warning lights, signs and guards as may be required.

1.06 OWNER OCCUPANCY

- A. Owner will occupy premises during a portion of the construction period in order to conduct their daily activities and operations. The library will be open only on Thursday, Friday and Saturday throughout the entire construction period.
- B. Cooperate with Owner or his representative in all construction operations to minimize conflict and to facilitate Owner's usage of building.
- C. Conduct construction operations to assure least inconvenience to Owner and public.
- D. Provide temporary heating and ventilation, temporary dust partitions, plastic sheeting, plywood sheeting, and any other means required to protect all elements of existing building from damage or deterioration during construction.
- E. Owner will remove all books, media and other items on library shelving in Owner to accommodate the construction sequence agreed upon by the Owner and Contractor.

1.07 PARTIAL OCCUPANCY

- A. Prior to occupancy, execute Certificate of Substantial Completion for designated area.
- B. Contractor provide: Access for Owner's personnel.
- C. Owner provides, upon occupancy:
  - 1. Maintenance
  - 2. Operation of HVAC, electrical systems.
  - 3. Security.

1.08 CONSTRUCTION SCHEDULING AND PHASING

- A. Owner intends to award the Contract and issue a Notice to Proceed within 60 days after bid opening.
- B. Contractor shall mobilize on site and begin work immediately thereafter.
- C. **Contractor must achieve Substantial Completion by November 2018.**
- D. **Contractor must achieve Final Completion by December 2018.**
- E. Provide explanation of scope of work to be accomplished for various phases or time frames.

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. Demolition:  
All existing Improvements on the site indicated on the Drawings to be demolished, shall be removed by Contractor. Use such methods as required to complete the work in compliance with all governing authorities and utility company requirements. All existing utility connections shall be disconnected, properly capped and removed by the Contractor. Complete removal of existing foundation walls or footings is required under new construction or other new foundations. Remove all below-grade wood and metal. Any existing basements, cisterns and/or other below grade voids shall be filled with compatible fill material suitable for proposed constructions and compacted per specific requirements. Completely remove cisterns located under new construction. All debris, rubbish, salvage and other materials shall be removed from the site. Protect all adjacent properties and structures, and existing buildings from damage.

E. 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.

F. 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.

- G. 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 01210 - CASH ALLOWANCES

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

A. Section Includes:

1. Schedule of allowances in Contract Sum for purchase of products, unless installation is also specified.
2. Contractor's costs included in Allowances.
3. Contractor's costs included in Contract Sum.
4. Architect Responsibilities.
5. Contractor's Responsibilities.
6. Correlation with contractor submittals.
7. Adjustment of allowances.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

Section 01110 - Summary of Work - Single Contract

Section 01370 - Schedule of Values

Individual Sections as listed in Schedule Allowances

1.03 SCHEDULE OF ALLOWANCES

A. Brick Allowance:

1. Allow a lump sum fee of **\$800** per thousand.
2. To be used for purchase and delivery of material to site.
3. Contractor to furnish brick count in thousands required to complete project.
4. To be included in Base Bid of Contract.
5. Refer to Section 04210 - Face Brick Masonry.

B. Furniture and Library Shelving Allowance:

1. Allow a lump sum fee of **\$175,000**.
2. To be used for purchase, delivery, and installation of new furniture and shelving.
3. To be used for labor to disassemble, inventory and reassemble existing library shelving.
4. Architect will select products, work with vendor, and deliver final invoice to General Contractor.
5. General Contractor will be permitted a 10% total markup above final invoice.
6. To be included in Base Bid of Contract.

1.04 CONTRACTOR'S COSTS INCLUDED IN ALLOWANCES

- A. Cost of product of Contractor and/or subcontractor, less applicable trade discounts.
- B. Delivery to Site.
- C. Applicable taxes.
- D. Labor for installation, if specified as such.

1.05 CONTRACTOR COSTS INCLUDED IN CONTRACT SUM

- A. Product handling at site, including unloading, uncrating, and storage.
- B. Protection of products from elements and from damage.
- C. Labor for fabrication, installation and finishing, except when installation is specified as part of allowance.
- D. Other expenses required to complete installation.
- E. Contractor's overhead and profit.



1.06 ARCHITECT RESPONSIBILITIES

- A. Consult with Contractor in consideration of products, suppliers and installers, as applicable.
- B. Select products, obtain Owner's written decision and transmit full information to Contractor.
  - 1. Manufacturer, product, model or catalog number, accessories, attachments, and finishes.
  - 2. Supplier and installer as applicable.
  - 3. Cost to contractor, delivered to site and installed as applicable.

1.07 CONTRACTOR RESPONSIBILITIES

- A. Assist Architect in determining suppliers and installers, and obtain applicable proposals when requested.
- B. Make recommendations for Architect's consideration.
- C. Promptly notify Architect of any reasonable objections against supplier or installer.
- D. Upon notification of selection, execute purchase agreement with designated supplier and installer, as applicable, just as with any other subcontractor or supplier on the project.
- E. Arrange for processing of shop drawings, product data, and samples.
- F. Arrange for delivery. Promptly inspect products upon delivery for completeness, damage, and defects.
- G. Install, adjust and finish products.
- H. Provide warranties for products and installation.

1.08 CORRELATION WITH CONTRACTOR SUBMITTALS

- A. Schedule shop drawings, product data, samples, and delivery dates, in Progress Schedule for products selected under allowances.

1.09 ADJUSTMENT OF ALLOWANCES

- A. Contractor shall submit proposal to Architect for any proposed change to allowances.
- B. Provide supportive data as required by Architect to substantiate costs of items included in allowances.
- C. All proposals shall be authorized by the Architect prior to execution and recorded in Contractor's as-built drawings and Architect's project record documents.
- D. Adjustment to Allowances will be made by Change Order.  
Any unused amounts to be credited back to the Owner.

END OF SECTION 01210

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 **\$100,000**.
- 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. 1: IRRIGATION SYSTEM**

- 1. Give the amount to be ADDED to the Base Bid:
  - a. Supply irrigation drip system to all new building planters per sheet L-301.
  - b. Supply ground irrigation sprinkler system at new courtyard per sheet L-301.
- 2. Base Bid to include:
  - a. No irrigation system supplied.

B. **ALTERNATE NO. 2: REFINISHING OF EXTERIOR INSULATION AND FINISH SYSTEM**

- 1. Give the amount to be ADDED to the Base Bid:  
If all existing "exterior insulation and finish systems" are refinished in accordance with Section 07240 Exterior Insulation and Finish System and the contract documents.

C. **ALTERNATE NO. 3a: LANDSCAPING IN RAIN GARDEN AREA**

- 1. Give the amount to be ADDED to the Base Bid:
  - a. Supply all shrubs, perennial, and ground cover located in the rain garden area per the plant schedule on L-101.
  - b. Supply hardwood mulch located in the rain garden area per sheet L-201.
  - c. Supply geo-textile fabric per detail 4/L-401.

- d. Supply 1'-1.5' of Bio-retention soil per detail 4/L-401.
  - e. Provide aluminum landscape edging surrounding rain garden area as shown on C-101.
2. Base Bid to include:
- a. Supply only two (2) Allegheny Serviceberry and two (2) Blackhaw Viburnum per the plant schedule on L-101.
  - b. Provide river gravel mulched area in raingarden area per sheet L-201.
  - c. Replace bio-retention soil with typical top soil ready to be seeded.
  - d. In lieu of hardwood mulch at rain garden, replace with seed and straw per specifications section 02930.
  - e. Provide all drainage structures, piping and material per grading and drainage plans C-201.
  - f. No aluminum edging provided in rain garden area.
- D. **ALTERNATE NO. 3b: LANDSCAPING IN COURTYARD AREA**
1. Give the amount to be ADDED to the Base Bid:
- a. Supply all trees, shrubs, perennial, and ground cover located in the courtyard area per the plant schedule on L-101.
  - b. Supply cocoa bean shell mulch located in the courtyard area per sheet L-201.
  - c. Supply flagstone path shown in courtyard area per sheet L-101.
  - d. Supply boulders in courtyard area per sheet L-101.
2. Base Bid to include:
- a. Entire courtyard area to have weed preventative fabric placed over finished grade.
  - b. River gravel mulch to be placed over entire courtyard area with no plant material.
  - c. Installation of new decorative fence per sheet C-101.
  - d. Installation of aluminum landscape edging per sheet C-101.
- E. **ALTERNATE NO. 4: FAMILY RESTROOM 122**
1. Give the amount to be ADDED to the Base Bid:
- a. All Plumbing work in this room as shown on the Drawings.
  - b. All Mechanical work in this room as shown on the Drawings.
  - c. All Electrical power as shown on the Drawings.
  - d. All toilet accessories in this room as shown on the Drawings.
  - e. Finishes as shown on the Drawings.
2. Base Bid to include:
- a. Installation of partition walls, door, frame and hardware, ceiling and light to construct a new Storage room.
  - b. Finishes as shown on the Drawings.
  - c. No Mechanical work in this room.
  - d. No Plumbing work in this room.
- F. **ALTERNATE NO. 5: EXISTING RESTROOM 119 IMPROVEMENTS**
1. Give the amount to be ADDED to the Base Bid:
- a. Renovate existing Restroom 119 to be a single occupancy ADA compliant family restroom as shown on the Drawings.
2. Base Bid shall include:
- a. Demolition of existing vanity and sink.
  - b. Provide new countertop and splashes, plastic laminate cabinets and new sink.
- G. **ALTERNATE NO. 6: NEW ROOF SCUTTLE AND ASSOCIATED LADDERS**
1. Give the amount to be ADDED to the Base Bid:
- If a roof scuttle and associated ladders are provided and installed in accordance with the contract

documents.

2. Base Bid: No roof scuttle or ladders.

H. **ALTERNATE NO. 7: OWNER VACATES PREMISES DURING CONSTRUCTION**

1. Give the amount to be ADDED to OR DEDUCTED from the Base Bid:  
If the Owner completely vacates the building during the construction period and stores books, computers, shelving and library furniture in storage containers, supplied by the Owner.
2. Base Bid: Owner shall maintain use of premises in accordance with Section 01110-Summary of work-Single Contract.

I. **ALTERNATE NO. 8A: RTU-3B MULTIZONE**

1. Give the amount to be ADDED to the Base Bid:  
Replace existing east roof top unit with RTU-3B (a gas fired multizone roof top unit) and all associated work for a complete installation.
2. Base Bid: No work at existing east roof top unit.

J. **ALTERNATE NO. 8B: RTU-2 and VAV BOXES**

1. Give the amount to be ADDED to the Base Bid:  
Replace RTU-2B with RTU-2 (a gas fired roof top unit) with all associated VAV boxes and all associated work for a complete installation.
2. Base Bid: Replace existing west roof top unit with RTU-2B (a gas fired multizone roof top unit).

K. **ALTERNATE NO. 8C: RTU-3 and VAV BOXES**

1. Give the amount to be ADDED to the Base Bid:  
Replace existing east roof top unit with RTU-3 (a gas fired roof top unit) with all associated VAV boxes and all associated work for a complete installation.
2. Base Bid: No work at existing east roof top unit.

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>
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- 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 00220 - Contractor's Bid Submittal Checklist.  
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 column centers, 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. Anchor Bolt Torque: Division 5.
  5. Structural Steel Connections: Division 5.
  6. Metal Roof Deck Fastening: Division 5.
  7. Metal Floor Deck Fastening: Division 5.
  8. Metal Shingle Roofing: Division 7.
  9. SBS Modified Bitumen Roofing: Division 7.
  10. Mechanical testing: Division 15.
  11. 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. Testing laboratory's qualifications:
1. Testing laboratory should be pre-qualified prior to bidding.
  2. Testing laboratory must have a registered professional engineer as full time staff.
  3. Testing laboratories 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 testing laboratories:
1. GEM Engineering, Inc.  
2219 Plantside Drive; Louisville, KY 40299  
502-493-7100; 502-493-8190 fax
  2. Alt & Witzig Engineering, Inc.  
4105 West 99th Street; Carmel, IN 46032  
317-875-7000; 317-876-3705 fax
  3. Hagerty Engineering, Inc. / Construction Solutions  
229 Walnut Street; Jeffersonville, IN 47130  
812-725.7580; 812-725.7584 fax
  4. Asher Engineering, Inc.  
1021 South Floyd Street; Louisville, KY 40203  
502-589-0073; 502-589-0076 fax
  5. Qore, Inc.  
13005 Middletown Industrial Blvd.; Louisville, KY 40223  
502-244-3848; 502-244-3580 fax
  6. ATC Group Services / Cardno ATC  
11001 Bluegrass Parkway, Suite 250; Louisville, KY 40299  
502-710-0264; 502-267-4072 fax

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. Pay all utility bills from the utility companies for Owner's existing established utility services within existing buildings and construction limits for the duration of construction.
3. 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.
4. 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. Each individual 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. Architect's Field Office.
  - c. Storage Trailers.
  - d. Enclosures.
  - e. Toilets.
  - f. Stairs, Ladders, Ramps, etc.
  - g. Temporary Fence.
  - h. Project Signage.
  - i. Construction Road, Parking Facilities.
2. Access Roads and Parking Areas.
3. Installation.
4. Removal and Cleanup.
5. Protection.
6. Temporary Use of Elevator.

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. Provided by each individual General or Prime Contractor if multiple contracts are applicable.
3. 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.

B. Architect's Field Office:

1. Provided by General Contractor, 8'x20' minimum size unit.
2. Provide desk, chair, filing cabinet, folding table for drawing layout, and ample space for drawings and specifications for use by Architect.
3. Provide table and folding chairs sufficient for project meetings.

4. Provide stairs and landing at entry.
  5. Provide independently secure locking unit with separate key, available only to Architect.
  6. Furnish emergency first-aid equipment, ABC fire extinguisher, extra hard hats.
  7. Provide dedicated separate telephone and fax lines for use by Architect.
  8. Complete set-up at beginning of project and removal at end of project.
  9. As approved by the Architect, a larger combination unit may be used by both the Contractor and Architect as field offices. Unit must allow for separate lockable offices for each, restroom facility, and ample area for project meetings and storage.
- C. Storage Trailers:
1. Provided by each General or Prime Contractor or subcontractor as required.
  2. Coordinate location with Architect.
  3. Remove at project completion and clean up area.
- D. Enclosures:
1. Provided by each individual General or Prime Contractor.
  2. Provide temporary weather-tight enclosures for all exterior openings.
  3. Equip exterior doors with locks and closures.
- E. Toilets:
1. Provided by each individual General or Prime 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. Temporary Fence:
1. Provided by each individual General or Prime Contractor.
  2. Chain link fence, 6'-0" high, minimum.
  3. Provide fencing located as necessary to enclose the entire project construction limits, prior to work beginning. Provide with gates of sufficient size and quantity.  
Coordinate all locations and requirements with Architect and Owner's Representative.
  4. Routing of fencing shall include all areas the Owner deems necessary to ensure the safety of the inhabitants of the site and the general public, as determined by construction operations on site.
  5. Provide separate entrance gates for union and non-union personnel.  
Gates shall be clearly identified. Locate gates at opposite ends of the project site.
- H. Project Signage:
1. Provided by each individual General or Prime Contractor.
  2. Provide project identification sign of wood frame and exterior grade medium density overlay plywood construction, painted with lettering by professional sign painter, per Architect's design and colors.  
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 and off site storage areas.
  4. No other signage or advertisement will be allowed on the project site.



- I. Construction Road, Parking Facilities:
  - 1. Provided by each individual General or Prime Contractor.
  - 2. Crushed Stone, #53 size.

2.02 ACCESS ROADS AND PARKING AREAS

- A. Construct and maintain temporary roads accessing public thoroughfares to serve construction area.
- B. Extend and relocate as Work progress requires. Provide detours necessary for unimpeded traffic flow.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Provide means of removing mud from vehicle wheels before entering streets.
- E. Parking: Provide temporary gravel surface parking areas to accommodate construction personnel.
  - 1. When site space is not adequate, provide additional off-site parking.
  - 2. Do not allow vehicle parking on existing pavement.
  - 3. Designate two parking spaces near Architect's field office.

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.
  - 8. 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.

3.04 TEMPORARY USE OF ELEVATOR

A. Elevator may be used by Contractor for temporary service during construction, after installation and inspection.

B. Provide and maintain temporary plywood lining and protective padding as required on floors, walls and ceiling of elevator cab.

C. Clean and Restore:

1. Inspect, clean, and restore to original condition, equal to new, all equipment and accessories.
2. Replace all worn or damaged parts.
3. Cost of temporary operation and repair shall be paid by General Contractor.

- D. Make necessary arrangements with elevator subcontractor for temporary acceptance.

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.

1.06 BUILDING SYSTEMS

A. Voice/Data Network System:

1. Owner's Responsibility:
  - a. Will determine the type of system to be used.
  - b. Furnish and install system equipment complete.
  - c. Provide servers, computers, routers, racks, handsets, switches, etc.



- d. Provide, install and connect all wire and cable from patch panels to system equipment.
- 2. Contractor's Responsibility:
  - a. Provide and install all cable tray, conduit, backboxes, junction boxes, backboards, power outlets, outlet devices and plates, patch panels, racks, patch cords, ventilation, sleeves through firewalls and floors and other items or work not specifically indicated.
  - b. Provide, install and connect all wire and cable from ultimate outlet locations to patch panels.
  - c. Complete final connections and testing and certification of those connections between ultimate outlet locations and patch panels.
  - d. See Electrical Drawings and Specifications for additional information and clarification.
- B. Video Presentation and Communication System:
  - 1. Owner's Responsibility:
    - a. Will determine the type of system to be used.
    - b. Furnish and install system equipment complete.
    - c. Provide, install and connect all wire and cable from ultimate outlet location to system equipment.
  - 2. Contractor's Responsibility:
    - a. Provide and install all conduit, backboxes, junction boxes, power outlets, outlet devices and plates, sleeves through firewalls and floors and other items or work not specifically indicated.
    - b. Provide and install wire and cable from patch panel to ultimate outlet location.
    - c. Coordinate with Owner's vendor/installer.
    - d. See Electrical Drawings and Specifications for additional information and clarification.
- C. Building Security System:
  - 1. Owner's Responsibility:
    - a. Will determine the type of system to be used.
    - b. Furnish and install system equipment complete.
    - c. Provide, install and connect all wire and cable complete.
  - 2. Contractor's Responsibility:
    - a. Provide and install all conduit, backboxes, junction boxes, power outlets, outlet devices and plates, sleeves through firewalls and floors and other items or work not specifically indicated.
    - b. Coordinate exact locations of backboxes in walls and ceilings prior to rough-in.
    - c. Coordinate with Owner's vendor/installer.
    - d. See Electrical Drawings and Specifications for additional information and clarification.
- D. Door Access Control System:
  - 1. Owner's Responsibility:
    - a. Will determine the type of system to be used.
    - b. Provide, install and connect all wire and cable to building security system complete.
  - 2. Contractor's Responsibility:
    - a. Provide and install all equipment, door hardware and components as included in bid documents.
    - b. Provide and install all wire and cable and connections between various equipment, door hardware and components and between these components and patch panel as required.
    - c. Provide and install all conduit, backboxes, junction boxes, power outlets, outlet devices and plates, sleeves through firewalls and floors and other items or work not specifically indicated.
    - d. Coordinate exact locations of backboxes in walls and ceilings prior to rough-in.
    - e. Coordinate with Owner's vendor/installer.
    - f. See Electrical Drawings and Specifications for additional information and clarification.
- E. All Other Items Indicated on Drawings as O.F.C.I.
  - 1. Owner's Responsibility:
    - a. Will determine the type system to be used.
    - b. Deliver items to job site.

2. Contractor's Responsibility:
  - a. Provide coordination, blocking and install items.
  - b. Provide any and all connections and provisions necessary to fully incorporate into the project.

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.
6. Remove existing construction necessary to install new materials, equipment, mechanical or electrical items.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

Section 01110- Summary of Work - Single Contract.

Section 01738- Selective Demolition.

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.
4. Advise Architect designating time work will be uncovered to provide for observation.

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. Cut existing walls, floors, ceilings, roofs, etc. necessary for the proper installation of new materials, equipment, mechanical or electrical items. Provide all necessary framing, lintels, hangers, etc. to maintain the structural integrity of the building system after cutting.
- F. Employ original installer to perform cutting and patching for exposed finished surfaces.
- G. 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 01738 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Section Includes:
1. Selective Demolition work included in project.
  2. Project demolition conditions.
  3. Electrical, Plumbing and HVAC Demolition.
  4. Utility demolition.
  5. Subsurface filling.
  6. Protection.
  7. Sawcutting and Demolition Through Existing Terrazzo Flooring.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- Section 01110 - Summary of Work - Single Contract.  
Section 01520 - Temporary Construction.

1.03 WORK INCLUDED

- A. The extent of demolition work shown on drawings and specified herein, including, but not limited to:
1. Opening of exterior walls for new doors, windows, grilles, louvers, mechanical, and electrical and providing weather-tight enclosures.
  2. Opening of interior walls, ceilings and floors necessary for proper installation of new materials, equipment, mechanical or electrical items.
  3. Removing interior walls, ceilings, floor finishes.
  4. Removing doors and frames.
  5. Removing casework and equipment.
  6. Removing existing HVAC system and components, both exposed to view and concealed.
  7. Removing existing plumbing fixtures, piping and components, both exposed to view and concealed.
  8. Removing existing lighting and electrical distribution, switches, outlets, conduit and other devices both exposed to view and concealed.
  9. Complete removal of existing building and all components.
- B. Interior demolition includes complete wrecking of interior partitions, finishes and structures and removal and disposal of demolished materials, as shown on drawings and herein specified.
- C. The Owner shall have the option of retaining any item removed. The Contractor shall deliver these items to the Owner's designated storage area. Any items not retained by the Owner shall be disposed of offsite by the Contractor. All items are to remain property of the Owner unless specifically designated otherwise.
- D. Some removed items are to be salvaged for re-use. Drawings indicate extent of such work.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 PROJECT DEMOLITION CONDITIONS

- A. Conditions of Structures:
  - 1. The Owner assumes no responsibility for actual conditions of structures to be demolished.
- B. Conditions of the structure existing at time of inspection for bidding purposes will be maintained by Owner in so far as possible. However, variations within structure may occur by Owner=s removal and salvage operations prior to start of demolition work.
- C. Pollution Controls:
  - 1. Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level.
  - 2. Comply with governing regulations pertaining to environmental protection.
- D. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.
- E. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing prior to the start of work.
- F. Partial Removal:
  - 1. Items of salvable value to Contractor, and not retained by Owner, may be removed from structure as work progresses. Salvaged items must be transported from site as they are removed.
  - 2. Storage or sale of removed items on site will not be permitted.
  - 3. Store items noted on drawings and specified to be salvaged for use in the project, so as to prevent damage or deterioration.
- G. Disposal of Demolished Materials:
  - 1. Remove from site debris, rubbish, and other materials resulting from demolition operations. Pay all fees related to removal and dumping.
  - 2. Remove and dispose of interior demolition debris off job site.
  - 3. Burning of removed materials from demolished structures will not be permitted.
  - 4. Transport materials removed from demolished structures and dispose of off site.
- H. Traffic:
  - 1. Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks, occupied areas, and other adjacent occupied or used facilities.
  - 2. Do not close or obstruct streets, walks or other occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- I. Protections:
  - 1. Ensure safe passage of persons around or through area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons. Provide protection in accordance with ANSI/NFPA 241.
  - 2. Erect temporary covered passageways as required by the Owner or authorities having jurisdiction.
- J. Use of explosives will not be permitted.

- K. Provide temporary enclosures at doors and other penetrations in walls, necessitated by weather and demolition conditions, and where dust proof partitions are indicated. Enclosures shall be constructed with fire retardant treated lumber, insulated and painted. Joints shall be taped and caulked to prevent dust and debris from migrating beyond construction areas. Maintain enclosures in good repair and remove when no longer needed. Extend partitions to deck.
- L. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.
- M. Repair any damage to property which is to remain in use, or that of any person, or persons on or off site caused by the demolition work without additional expense to Owner.
- N. Use of jackhammers during normal operating hours of the facility will not be permitted.
- O. Where a portion of construction (walls, floors, ceilings, etc.) is indicated to be removed, demolition shall include the removal of any and all items either surface-mounted on it, or concealed within it, unless otherwise indicated to remain or be salvaged for reuse.

3.02 ELECTRICAL

- A. Visit the site before submitting a bid to observe existing conditions.
- B. Work in existing building shall be scheduled well in advance with the Owner. Work shall be performed at such times and under such conditions as suit the convenience of the Owner. Plan the Work to minimize disruption of normal operations.
- C. Remove wiring devices, fixtures, components, electrical equipment, conductors, boxes and conduits not required to remain in service in remodeled areas when this Project is complete.
- D. Reconnect circuits to other panelboards when necessary to complete the renovation.
- E. Remove existing conduit and wire from areas to be remodeled, back to panelboard, cabinet or junction box. Where such Work would not be possible without disturbing areas not being renovated, consult with the Architect prior to performing the Work.
- F. When outlets are covered up or are otherwise rendered inaccessible, all wiring shall be removed to the source. If a circuit that must remain in service is interrupted, it shall be reconnected by the most inconspicuous means so that it remains operational, with the same capacity as before. All building surfaces damaged, and openings left by removal of boxes, conduit, or other equipment shall be repaired. All holes left in junction boxes, switches, panels and other equipment shall be closed.
- G. Where new openings are cut and concealed conduits or other electrical items are encountered, they shall be removed or relocated as required. Where conduit to be removed stubs through floors, walls, and ceilings, such conduit shall be removed to the point where the finished surfaces can be patched so that no evidence of the former installation remains.
- H. Where a circuit is interrupted by removal of a device or fixture from that circuit, install wire and conduit as required to restore service to the remaining devices and fixtures on that circuit. If the interrupted piping is concealed in walls or under floors, an alternate route may be required.
- I. Lighting fixtures, wiring devices, panelboards, and conductors removed shall be offered to the Owner's Representative. If he chooses to retain these items or a part of these items, turn those chosen over to him. Items rejected by Owner's Representative shall be removed from the project site by the

Contractor.

3.03 PLUMBING

- A. Visit the site before submitting a bid to observe existing conditions.
- B. Work in existing building shall be scheduled well in advance with the Owner. Work shall be performed at such times and under such conditions as suit the convenience of the Owner. Plan the Work to minimize disruption of normal operations.
- C. Remove piping, fixtures, components, valves, insulation and fittings not required to remain in service in remodeled areas when this Project is complete.
- D. Reconnect piping to provide service when required to complete the renovation.
- E. Remove existing piping from areas to be remodeled, back to service branch. Where such Work would not be possible without disturbing areas not being renovated, consult with the Architect prior to performing the Work.
- F. When outlets are covered up or are otherwise rendered inaccessible, all piping shall be removed to the source. If a fixture that must remain in service is interrupted, it shall be reconnected by the most inconspicuous means so that it remains operational, with the same capacity as before. All building surfaces damaged, and openings left by removal of fixtures, piping, or other equipment shall be repaired. All holes left shall be closed.
- G. Where new openings are cut and concealed piping or other plumbing items are encountered, they shall be removed or relocated as required. Where piping to be removed stubs through floors, walls, and ceilings, such piping shall be removed to the point where the finished surfaces can be patched so that no evidence of the former installation remains.
- H. Where piping is interrupted by removal of a piping or fixture, install piping as required to restore service to the remaining fixtures on that service line. If the interrupted circuit is concealed in walls or under floors, an alternate route may be required. If the interrupted piping is concealed in walls or under floors an alternate route may be required.
- I. Plumbing fixtures, valves, and gages removed shall be offered to the Owner's Representative. If he chooses to retain these items or a part of these items, turn those chosen over to him. Items rejected by Owner's Representative shall be removed from the project site by the contractor.

3.04 HVAC

- A. Visit the site before submitting a bid to observe existing conditions.
- B. Work in existing building shall be scheduled well in advance with the Owner. Work shall be performed at such times and under such conditions as suit the convenience of the Owner. Plan the Work to minimize disruption of normal operations.
- C. Remove piping, ductwork, equipment, components, valves, insulation, fittings and controls not required to remain in service in remodeled areas when this Project is complete.
- D. Reconnect piping and ductwork to provide service when required to complete the renovation.
- E. Remove existing piping and ductwork from areas to be remodeled, back to service branch. Where such Work would not be possible without disturbing areas not being renovated, consult with the Architect



prior to performing the Work.

- F. When grilles and diffusers are covered up or are otherwise rendered inaccessible, all ductwork shall be removed to the source. If an HVAC equipment item which must remain in service is interrupted, it shall be reconnected by the most inconspicuous means so that it remains operational, with the same capacity as before. All building surfaces damaged, and openings, left by removal of grilles, piping, or other equipment shall be repaired. All holes left shall be closed.
- G. Where new openings are cut and concealed piping, ductwork, or other HVAC items are encountered, they shall be removed or relocated as required. Where piping, ductwork or controls to be removed stubs through floors, walls and ceilings, such items shall be removed to the point where the finished surfaces can be patched so that no evidence of the former installation remains.
- H. Where piping or ductwork is interrupted by removal of a branch or equipment, install material as required to restore service to the remaining items on that service line. If the interrupted piping or duct is concealed in walls or under floors, an alternate route may be required.
- I. HVAC equipment, valves, and gages removed shall be offered to the Owner's Representative. If he chooses to retain these items or part of these items, turn those chosen over to him. Items rejected by Owner's Representative shall be removed from the project site by the Contractor.
- J. Equipment removed from roof shall include curbs, sleepers, flashing boxes, etc. Install new roof decking to match existing. Install roof insulation and matching membrane system to maintain any roof warranties.
- K. Equipment removed from finished interior spaces shall include patching and restoration to match all adjacent finishes.
- L. All temperature controls shall be maintained, rerouted, reconnected, or reprogrammed to maintain operation of HVAC equipment.

### 3.05 UTILITY DEMOLITION

- A. Utility Services:
  - 1. Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations.
  - 2. Allow no interruption in service unless coordinated with Owner at least 72 hours in advance.
- B. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.
- C. Disconnect and seal utilities serving each structure to be demolished, or interior area to be demolished, prior to start of demolition work.
- D. If utility service or other services to an occupied area (such as emergency power, heating, medical gas, air conditioning), are to be disconnected, provide temporary or alternative service to that area.
- E. Cap all utility lines terminated by the demolition work in a manner approved by the governmental authorities and utility companies having jurisdiction.
- F. Mark location of disconnected utilities. Identify and indicate capping location on project record documents.

3.06 SUBSURFACE FILLING

- A. Filling Basement and Voids:
  - 1. Completely fill below-grade areas and voids resulting from demolition of structures.
  - 2. Perform filled and compaction in accordance with requirements of Section 02200 - Earthwork.

3.07 PROTECTION

- A. Provide temporary construction in accordance with requirements of Section 01520- Temporary Construction as required in all areas of demolition work.
- B. Provide levels of protection as deemed necessary by Owner for protection of public into space, project, and site.

3.08 SAWCUTTING AND DEMOLITION THROUGH EXISTING TERRAZZO FLOORING

- A. Contractor is to take extreme care to coordinate sawcutting through areas of existing terrazzo flooring to provide ease of patching and repairing surfaces with new terrazzo.
- B. Contractor shall coordinate sawcutting of all trades with the Architect so that a review of proposed cuts can be analyzed and discussed prior to completing the cutting.
- C. Sawcuts are to be made parallel and perpendicular to the walls of the room in which they occur and are to be straight, true and smooth. Whenever possible, sawcuts are to be made in areas that will be located beneath permanent new construction, such as installed casework or equipment, so that the new terrazzo patching will be less conspicuous.
- D. When area of room or space has more than 75% of the surface of existing terrazzo removed for installation of new work by any trades, the Contractor is to remove the remaining portion of existing terrazzo, whether indicated or not, so that the entire area will receive new terrazzo and not require a match of new to existing.

END OF SECTION 01738

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. Cash Allowances
    - c. Contingency Allowance.
    - d. Unit Prices
    - e. Deductions for uncorrected work.
    - f. Penalties and Bonuses.
  - 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, Sub consultants 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. Elevator.
- H. 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.
- G. Notify Architect to attend all training sessions.

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:

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Facility address:

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**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:

---

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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. Porcelain Tile Flooring and Base:

1. Provide to Owner maintenance stock of at least (6) floor tiles.
2. Provide to Owner maintenance stock of at least (3) base tiles.

C. Ceramic Tile Wall Tile:

1. Provide to Owner maintenance stock of at least (16) square feet of wall tile.

D. Acoustical Ceiling Panels:

1. Provide to Owner maintenance stock of at least (24) tiles.

E. Vinyl Composition Tile Flooring:

1. Provide to Owner maintenance stock of at least (6) tiles.

F. Luxury Vinyl Tile Flooring:

1. Provide to Owner maintenance stock of at least (10) tiles.

G. Rubber Base:

1. Provide to Owner maintenance stock of at least (20) linear feet.

H. Modular Carpet Tiles:

1. Provide to Owner maintenance stock of at least (12) tiles of field color.
2. Provide to Owner maintenance stock of at least (8) tiles of each accent color.

I. Paint:

1. Provide to Owner maintenance stock of at least (2) unopened gallon containers of each color.

J. Textile Wall Covering:

1. Provide to Owner maintenance stock of at least (100) square feet.

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 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.
  - 5. Tree removal and protection.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 02060 - Building Demolition
- 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.
- E. When trees are shown to be removed, it shall mean grub out stumps and remove from property. Trees to be removed are indicated on the Drawings.

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.

3.07 TREE PROTECTION

- A. The contractor shall be responsible for the protection of tops, trunks and roots of existing trees on project site that are to remain.
- B. Existing trees subject to construction damage shall be fenced to the limits of their branch spread or otherwise protected before any work is started; remove fencing when complete. Remove interfering branches without injury to trunks and cover scars with tree paint. Do not permit heavy equipment or stockpiles within branch spread.
- C. In general, do not excavate within the tree protection zone or within the branch spread of trees. Where excavating, fill or grading is required within the branch spread of trees that are to remain, the work shall be performed as follows:
  - 1. Trenching: When trenching occurs around trees to remain, the tree roots shall be tunneled under or around the roots by careful hand digging and without injury to 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. Computer generated cut and fill calculations.
  - 8. Subgrade shall be graded to drain during the entire construction period.
  - 9. 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 removed from the site and hauled off and disposed of offsite 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 a Soils Engineer, as acceptable to the Architect, for testing and inspection service for quality control testing during all earthwork operation.
  - 2. See Section 1400 - Quality Control.
  - 3. If not already covered by another Section of these Specifications, submit Soils Engineer's credentials for acceptance.
- 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:

1. Cohesive and stable earth as described above, suitable for bearing.

#### 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/ft<sup>2</sup> (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.

### 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 D698.
  - 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. Qualifications of Soils Engineer.
2. 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, grade beams, crawlspaces and basement walls.
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 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 and Curbs.

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>Metric Size</u>	<u>Percent Passing by Weight</u>	
		<u>Binder</u>	<u>Surface</u>
1 inch	25.0 mm	100	100
3/4 inch	19.0 mm	90 - 95	100
1/2 inch	12.5 mm	70 - 92	100
3/8 inch	9.50 mm	50 - 76	85 - 95
No. 4	4.75 mm	35 - 40	55 - 70
No. 8	2.36 mm	18 - 45	30 - 65
No. 16	1.18 mm	10 - 36	15 - 50
No. 30	600 $\mu$ m	6 - 26	8 - 40
No. 50	300 $\mu$ m	2 - 18	3 - 25
No. 100	150 $\mu$ m	0 - 11	0 - 15
No. 200	75 $\mu$ m	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 02720 - SITE DRAINAGE

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Section Includes:

1. Perforated Drainage Tile.
2. Polyethylene Plastic Piping (HDPE).
3. Drainage Structures, Risers, and Inlets for Plastic Piping.
4. Grates and Covers for Plastic Piping.
5. Through-Wall Downspout Nozzle.

- 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, cutsheets, 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. 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.
- D. Grates and 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. Heavy duty (H-20, DOT rated) in all paved areas, parking lots, drives or other vehicular access area.



4. Grates designed to accommodate the heavy-duty PVC drainage structure piping.
  5. All inlet grates to be slotted type, domed in all lawn or landscape areas, flat in all paved areas.
  6. High flow vane type at all curb inlets, 24" x 36", unless otherwise noted.
  7. Install slots and openings in grates perpendicular to flow of traffic.
  8. Manhole and cleanout covers to be solid type version of inlet grates, flat and soil tight.
  9. All ductile grates to conform to all requirements of ASTM A-536 grade 70-50-05.
- E. Through-Wall Downspout Nozzle:
1. Provide one of the following approved products:
    - a. "Zurn" Z199 Downspout Nozzle.
    - b. "Jay R. Smith Mfg., Co." 1770.
  2. All nickel bronze body.
  3. Threaded inlet.

### 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.
- G. Install at line of all perimeter exterior footings, whether indicated on Drawings or not. Coordinate location of final outflow or connection to storm sewer with Architect.

#### 3.02 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 and manholes 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" for all pipe 48" in diameter and less, and 2'-0" for pipe over 60" in diameter.

### SUBMITTAL CHECKLIST

1. Product Data.

END OF SECTION 02720

SECTION 02810 - IRRIGATION SYSTEM

PART 1 – GENERAL

1.01 WORK INCLUDED

- A. Furnish system design, layout, labor, materials, equipment, special tools, supervision and services required to provide a complete, fully operational irrigation system.
- B. System to provide irrigation for all grass, landscape, and lawn areas within property lines, or otherwise as indicated on the Drawings.
- C. Provide a separate water meter and tap to serve only the irrigation system, separate from the domestic water supply for the building, whether indicated or not. Coordinate all requirements and install complete.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 02930 - Lawns and Grasses
- Section 02950 - Trees, Plants and Ground Cover
- Section 15420 - Plumbing Pipe Outside Building

1.03 QUALITY ASSURANCE

- A. Applicator's Qualifications:
  - 1. Contractor must have satisfactorily installed acceptable underground irrigation system(s) on at least 3 other projects of comparable complexity, and be able to produce a list of referenced projects to visit upon request.
  - 2. 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.

1.04 SUBMITTALS

- A. Shop Drawings:
  - 1. All drawings to be completed by a Certified Irrigation Designer (CID).
  - 2. Submit complete layout drawings prior to installation.
  - 3. Indicate piping sizes, sprinkler heads, valves, controller, and installation details.
  - 4. Indicate zones of head operation.
- B. Manufacturer's Data:
  - 1. Submit each manufacturer 's catalog of parts and components.
- C. Installation Instructions:
  - 1. Submit installation instructions and details.
- D. Operating Instructions:
  - 1. Submit written operating instructions including winterization procedures.
  - 2. Submit a schedule indicating length of time each valve is to be open to produce a given amount of precipitation.
- E. Certificate of Qualifications:
  - 1. Submit certification of installer's experience identifying previous projects with names of Owners and Architect/Engineer.
- F. Maintenance Instructions:
  - 1. Submit maintenance instructions on all items and components for entire system.

1.05 EXTRA STOCK

- A. Provide the following to the Owner:
  - 1. Two (2) sprinkler heads of each size and type.
  - 2. Two (2) valve keys for operating valves.
  - 3. Two (2) keys for valve markers.
  - 4. Two (2) wrenches for each type of head cover.
  - 5. Two (2) wrenches for removing and installing each type of head.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver, handle and store system components at the job site in such a manner as to prevent damage.
- B. Remove all damaged or otherwise unsuitable system components from the job site.

1.07 WARRANTY

- A. Provide written manufacturer 's guarantee against defective workmanship and materials as follows:
  - 1. Three (3) years on rotors and heads.
  - 2. Five (5) years on controllers and valves.

1.08 OWNER'S INSTRUCTIONS AND TRAINING

- A. Provide Owner with training session on all procedures for system operation and maintenance.
- B. Provide overview of items required for annual start-up and annual closeout of system.
- C. Contractor to videotape training session for continued use and internal training by Owner.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide entire system from a single manufacturer by one of the following or an approved equivalent:
  - 1. "Hunter".
  - 2. "Toro".
  - 3. "Rain Bird".

2.02 PIPE AND PIPE FITTINGS

- A. Main Lines:
  - 1. PVC Pipe: Schedule 40 PVC 1120, Type 1, Grade 1 belled end type. ASTM D 1785, ASTM (2"-12") and ASTM D 2665 (1-1/2" – 12").
  - 2. PVC Fittings: Schedule 40 PVC 1120, Type 1, Grade 1, socket type, ASTM D 2466.
  - 3. Solvent Cement: ASTM D 2564-67.
- B. Laterals/Branch Lines:
  - 1. PVC Pipe: Schedule 40 PVC 1120, Type 1, Grade 1, belled end type. ASTM D 1785, ASTM (2"-12") and ASTM D 2665 (1-1/2" – 12").
  - 2. PVC Fittings: Schedule 40 PVC 1120, Type 1, Grade 1, socket type, ASTM D 2466.
  - 3. Solvent Cement: ASTM D 2564-67.
  - 4. 1/2" PVC piping is not fabricated as Schedule 40, but rather Class 315.
- C. Risers/Piping Under Roads and Pavement:
  - 1. PVC Pipe: Schedule 80 PVC 1120, Type 1, Grade 1, threaded. ASTM D 1785.
  - 2. PVC Fittings: Schedule 80 PVC 1120, Type 1, Grade 1, threaded. ASTM D-2464-67.

2.03 ZONE VALVES

- A. Electrically operated: Globe valve, normally closed, with bronze body and top cover, integrally molded single-seat, diaphragm operated, 24 volt electric-solenoid actuated; and with manually operated adjusting stem enabling valve to be partially or fully closed.

2.04 AUTOMATIC CONTROLLER

- A. Wall mounted non-corrosive housing with locking cover.
- B. 24 V.A.C., U.L. listed plug-in transformer.
- C. 14 day programming capability.
- D. 5-Station minimum:
  - 1. 0-60 minute timing per station, infinite adjustment.
  - 2. Minimum 3 programmable watering schedules.
  - 3. 365-day calendar schedule.
- E. Fused circuit protection.
- F. Operation:
  - 1. Automatically, semi-automatically or manually at discretion of operator.
- G. Power Requirements:
  - 1. Input: 120 volt A.C.
  - 2. Output to valves: 24 volt A.C.
  - 3. Output to pump starter: 24 volt A.C.
  - 4. Built-in battery and non-volatile memory to retain time, date and watering schedules during periods of power failure.

2.05 ELECTRIC CONDUIT AND FITTINGS

- A. Underground plastic conduit: Class III.
- B. Above ground conduit: Aluminum.

2.06 LAWN IRRIGATION EQUIPMENT

- A. Sprinkler Heads:
  - 1. Heads specifically designed for use on commercial applications and performance athletic fields. No residential type rotors or sprinkler heads will be acceptable.
  - 2. Pop-up heads, full 4" extension.
  - 3. Adjustable full and part circle operation up to 360 degrees.
  - 4. Top adjust arch adjustment with screwdriver only.

2.07 ZONE VALVE BOXES

- A. Boxes for valves 3" or larger: 12" diameter HDPE barrel with standard HDPE cover.
- B. Boxes for valves 2-1/2" and smaller: 12" diameter HDPE barrel with standard HDPE cover.
- C. Marking: Mark valve box covers with "Irrigation Valve".
- D. Boxes shall be from grade to top of valve.

2.08 RAIN CONTROL

- A. Provide "Rain Brain" for automatic shut-off of system control in times of rainy weather that would not require artificial watering of the areas covered by the irrigation system.
- B. Install in area most appropriate for system control and as approved by Architect.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General:
  - 1. Coordinate installation of all irrigation system piping and components with installation of any/all sub-surface drainage or piping systems, electrical conduits, utilities, and the like.
- B. Excavating and Trenching:
  - 1. Trenching:
    - a. Excavate trench to pipe grade depth.
    - b. Make width of trench at least 6" (152mm) or 1-1/2 times the diameter of pipe, whichever is wider.
    - c. Backfill and hand tamp any over-excavation prior to installing piping.
    - d. In soils containing rock or other hard material that might damage pipe, excavate trenches deeper than the required; and then backfill to pipe grade with selected fine earth or sand.
    - e. Keep trenches free of obstructions and debris that would damage pipe.
    - f. Do not mix subsoil with topsoil.
  - 2. Jacking or Boring:
    - a. Jack or bore under walks, drives, and other obstacles at a depth conforming to bottom of adjacent trenches.
- C. Piping System:
  - 1. Cover:
    - a. Install horizontal mainline underground piping with cover of not less than 18".
    - b. Install horizontal lateral underground piping with cover between 12"-18".
  - 2. Clearances:
    - a. Maintain following minimum horizontal clearances between lines:
      - 1. Pipe 2" (51mm) and smaller: 4" (100 mm)
      - 2. Pipe 2-1/2" (63mm) and larger: 12" (300 mm)
      - 3. Other services: 12" (300 mm)
    - b. Maintain a minimum 1" (25mm) vertical clearance between lines crossing at an angle greater than 45 degrees.
- D. Piping Erection (PVC):
  - 1. All joints shall be free of foreign matter. At the termination of pipe laying the open end of the pipeline shall be closed off by a suitable cover until laying operations are resumed.
  - 2. Solvent Welded Joints:  
All dirt, dust and moisture shall be removed from the surfaces to be welded. Solvent and/or filler solvent shall be applied in a method recommended by the pipe manufacturer.
  - 3. Breaks in Pipe or Joints:  
Shall be repaired to the satisfaction of the engineer and at the expense of the contractor.
  - 4. Cutting Pipe:

All cutting of the pipe shall be done in a neat workmanlike manner with the least amount of waste and without damage to existing or new lines. Cut must be square and ragged edges removed with a cutting tool and/or file.

5. All pipe shall be laid with a protective cover.
6. Backfilling shall be carefully placed to avoid dropping rocks or large clods on the pipe. All backfill within six inches of the pipe shall contain no stones larger than one inch.
7. Service lines and laterals must be assembled so that no strain is placed on the pipe during or after backfill operations.

E. Valves:

1. Automatic Zone Valves: Install valves with a minimum of 12" cover measured from finish grade to top of PVC pipe connection.

F. Sprinkler Heads:

1. Adjust all heads for spray coverage of entire area indicated to be covered by the irrigation system.
2. Provide type of heads most appropriate to serve this purpose or replace and exchange heads as required to provide proper and full coverage of all areas.

G. Backfill:

1. Do not backfill until system has been tested and accepted.
2. For first 3" (76mm) over pipe, backfill with dirt or sand fine enough to pass 1/4" sieve, and compact by water method.
3. Fill remainder of trench to within 3" (76mm) of top with excavated soil, and water to compact soil.
4. Fill top 3" (76mm) with topsoil and wheel roll until compaction of backfill is same as surrounding soil.

3.02 INSPECTION:

- A. Do not enclose or cover any work until it has been inspected, tested, and accepted.

3.03 TESTING AND FLUSHING

A. Flushing:

1. After all piping, risers, and valves are in place and connected, but prior to installation of sprinkler heads, thoroughly flush piping system under a full head of water.
2. Maintain flushing for 3 minutes through furthestmost valve.
3. After flushing cap all risers.

B. Testing: Conduct tests in present of Architect/Engineer.

1. Pressure Test:

- a. Hydrostatically test the piping system in place before backfilling.
- b. Maintain a minimum test pressure of 175 psi without pumping for period of not less than one hour.
- c. Test is acceptable if no leakage or loss of pressure is evident during the period.
- d. Detect and repair all leaks.
- e. Retest the system until test pressure can be maintained for duration of the test.

C. Operation Test:

1. At conclusion of pressure test, install sprinkler heads, and test entire system for operation under normal operating pressure.
2. Test is acceptable if system operates in a satisfactory manner, with uniform coverage of areas to be sprinkled.

3.04 RESTORATION

- A. After installation has been completed, return area to its original condition.
- B. Properly replant all plant material removed during installation.
- C. Replace all permanent features disturbed by installation of the system.

SUBMITTAL CHECKLIST

- 1. Shop Drawings.
- 2. Manufacturer ' s Data.
- 3. Installation Instructions.
- 4. Operating Instructions.
- 5. Certificate of Qualifications.
- 6. Maintenance Instructions.

END OF SECTION 02810



SECTION 02825 – WELDED ORNAMENTAL FENCE SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, supervision and services required to furnish and install a complete welded ornamental fence system as indicated, noted and detailed on the drawings and specified herein.
- B. Furnish labor, materials, equipment, special tools, supervision and services required to furnish and install a fence post foundation system as indicated, noted and detailed on the drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 02200 - Earthwork.  
Section 02835 - Segmented Retaining Wall.  
Section 03300 - Cast-In-Place Concrete.

1.03 REFERENCES

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- B. ASTM D523 - Test Method for Specular Gloss.
- C. ASTM D714 - Test Method for Evaluating Degree of Blistering in Paint.
- D. ASTM D822 - Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.
- E. ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
- F. ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
- G. ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

1.04 SUBMITTALS

- A. Product Data:
  - 1. Submit manufacturer's published literature describing products.
  - 2. Submit manufacturer's installation procedures.
- B. Shop Drawings:
  - 1. Include details, dimensions, fence heights, post and rail sizes and spacing, footings, connections and accessories.
- C. Color Charts and Samples:
  - 1. Charts indicating manufacturer's entire selection of finishes.
  - 2. If requested, provide actual color samples in lieu of printed charts alone.

1.05 PRODUCT HANDLING AND STORAGE

Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism and theft.

PART 2 – PRODUCTS

2.01 WELDED ORNAMENTAL FENCE SYSTEM

A. Acceptable Manufacturers:

1. Provide products, as approved by the Architect, from one of the following manufacturers:
  - a. “Ameristar Fence Products”.
2. Basis of Specification:
  - a. “Ameristar”, Montage II With Genesis Fence Cap
  - b. 6'-0" height.
  - c. Double top rail with single lower rail.
  - d. Standard picket spacing, 4" o.c. maximum.
  - e. Standard post spacing, 8'-0" o.c. maximum.

B. Material:

1. Steel material for fence panels and posts shall conform to the requirements of ASTM A653/A653M, with a minimum yield strength of 50,000 psi (344 MPa) and a minimum zinc (hot-dip galvanized) coating weight of 0.60 oz/ft<sup>2</sup> (184 g/m<sup>2</sup>), Coating Designation G-60.
2. For fence systems up to and including 6 feet tall, material for pickets shall be 3/4" square x 16 Ga. steel tubing.
3. The rails shall be steel channel, 1.5" x 1.5" x 14 Ga. Picket holes in the rail shall be spaced for standard picket space.
4. For fence systems up to 6 feet tall, posts shall be a minimum of 2-1/2" square x 12 Ga.

C. Fabrication:

1. Pickets, rails and posts shall be pre-cut to specified lengths. Rails shall be pre-punched to accept pickets.
2. Pickets shall be inserted into the pre-punched holes in the rails and shall be aligned to standard spacing using a specially calibrated alignment fixture. The aligned pickets and rails shall be joined at each picket-to-rail intersection.
3. The manufactured panels and posts shall be subjected to an inline electrode position coating (E-Coat) process consisting of a multi-stage pretreatment/wash (with zinc phosphate), followed by a duplex application of an epoxy primer and an acrylic topcoat. The minimum cumulative coating thickness of epoxy and acrylic shall be 2 mils (0.058 mm).
4. The color shall be selected by Architect from manufacturer's entire standard selection.

D. Swing Gates:

1. Single or Double as shown on the Drawings.
2. Size as indicated on the Drawings.
3. If not indicated on the Drawings, provide single 3'-0" wide gates throughout.
4. Provide heavy-duty barrel or box hinges.
5. Provide lockable latch system.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verify that final grading in fence location is completed without irregularities which would interfere with

fence installation.

- B. Measure and lay out complete fence line per layout on Drawings.

### 3.02 INSTALLATION

#### A. Welded Ornamental Fence System:

1. Fence posts shall be concreted into fence post foundation system cavity.
2. Fence posts shall extend a minimum distance of 18” into the sleeve to ensure proper engagement.
3. All posts must be on “inboard” side of vertical portion of cantilever base. Do not install posts between vertical leg and wall face.
4. Fill cavity completely with concrete. Hold top of fence post foundation down 4” from finished concrete elevation to allow concrete slab to pour over foundation.
5. Fence panels shall be attached to posts with brackets supplied by the manufacturer. Field cut panels as required to match layout indicated on Drawings.

### 3.03 CLEANING

- A. Contractor shall clean the jobsite of excess materials.
- B. Clean fence to remove all dirt, concrete, etc. from all surfaces.

### SUBMITTAL CHECK LIST

1. Product Data.
2. Shop Drawings.
3. Color Charts and Samples.

END OF SECTION 02825

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.
- 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.
- Section 02950 - Trees, Plants and Ground Covers.
- Section 02951 - Steel Maintenance Edging
- Section 02952 - Aluminum Maintenance Edging
- Section 02953 - L-Shaped Aluminum Maintenance Edging

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 SEED

- 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 SOD

- A. Fine Blade Fescue:
  - 1. Grass composition to match seed mix specified.
  - 2. Fibrous, well and deeply rooted.
  - 3. Grown in general locality of use.
  - 4. Free from all noxious and pernicious weeds.
- B. Size:
  - 1. Width: 18" minimum.
  - 2. Length: 36" or as convenient for handling.
  - 3. Thickness: 1" minimum.
- C. Grass Height:
  - 1. Uniform thickness with cut height of 3".
  - 2. Soil thickness to be not less than 1" and not more than 1-1/2".
- D. Uniformity in color, texture, density and width with even edges.

2.03 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.

2.04 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.

2.05 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. Sod:
  1. Scarify soil to depth of 2" in compacted area.
  2. Apply fertilizer to soil at rate of 12 pounds per 1,000 square feet immediately prior to seeding.
  3. Lightly moisten sod immediately prior to laying sod during hot weather.
- D. 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 SODDING

- 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 sod is to be laid, all soft spots and inequalities in grade shall be corrected.
- C. Prior to sodding, mix commercial fertilizer into the seedbed at a rate of 12 pounds per 1,000 square feet.
- D. Lay first row of sod in straight line with long dimension perpendicular to angle of slope.
- E. Start sodding at bottom of slopes.
- F. Butt rows tightly together so that no voids occur.
- G. Stagger end joints.
- H. Do not fill joints between pads.

- I. Tamp or roll entire sodded area just prior to watering.
- J. Provide initial watering of sod as it is being placed.
- K. Roll each area immediately after initial watering.
- L. Water entire sodded area thoroughly within 4 hours of initial placement.
- M. The complete sodded surface shall be true to finished grade, even and firm at all points.
- N. Sod on Slopes:
  - 1. Sod on slopes 2:1 or steeper shall be held in place with stakes to secure sod in place along the sloped surface.
  - 2. Stake shall be driven through the sod and into the soil until they are flush with the top of the sod.

3.04 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. 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.
- I. 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.

3.05 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.

3.06 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 02950 - TREES, PLANTS AND GROUND COVER

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnishing, installing and guaranteeing plantings as scheduled. Furnish labor, materials, equipment, special tools, supervision and services to perform all landscape work indicated, noted and detailed on the drawings and specified herein.
  
- B. Section Includes:
  - 1. Trees and Plants.
  - 2. Wood Mulch.
  - 3. Stone or Rock Mulch.
  - 4. Topsoil.
  - 5. Fertilizer and Herbicide.
  - 6. Landscape Boulders.
  - 7. Accessories.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 01210 - Cash Allowances
- Section 02110 - Site Clearing
- Section 02200 - Earthwork
- Section 02930 - Lawns and Grasses
- Section 02951 - Steel Maintenance Edging
- Section 02952 - Aluminum Maintenance Edging
- Section 02953 - L-Shaped Aluminum Maintenance Edging

1.03 QUALITY ASSURANCE

- A. Comply with the following standards:
  - 1. "American Standard for Nursery Stock," Latest Edition, American Association of Nurserymen.
  - 2. Plant Hardiness Zone Map, Latest Edition, Miscellaneous Publication No. 814 Agricultural Research Service, U.S. Department of Agriculture.
  - 3. Indiana Association of Nurserymen Standards.
  - 4. Indiana State Highway Standard Specifications, Latest Edition.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Delivery:
  - 1. Deliver fertilizer in supplier's original unopened package.
  - 2. Pack, transport and handle plants with utmost care to protect against injury.
  - 3. Ball and burlap wrap and tie plants, or mud cover bare roots.
  - 4. Maintain plant stock in shade house for week after digging.
  - 5. Label trees and plants to remain legible min. 60 days.
  - 6. Do not prune trees before delivery.

1.05 JOB CONDITIONS

- A. Install trees, shrubs and ground cover planting before lawns are installed.
- B. Coordinate sequence of work with other trades.

1.06 WARRANTY

- A. Guarantee new plant material for one year after all plants are installed.
- B. During period of one year, replace dead, dying and unhealthy plants, and those whose appearance has

been destroyed due to loss of branches and other damage.

- C. Guarantee replacement plants under this guarantee for one year from date of installation.
- D. Repair damage to other plants or lawns during plant replacement at no cost to Owner.
- E. Guarantee to include plant material, soil preparation, guying and maintenance.

1.07 SUBMITTALS

- A. Product Data:
  - 1. Submit manufacturer's published literature describing products.
  - 2. Submit schedule of planting materials or verification of items as scheduled on the Drawings.

PART 2 - PRODUCTS

2.01 PLANTS

- A. Planting Schedule:
  - 1. Indicates quantity, size and type of planting.
  - 2. If discrepancies between a listed quantity and plant quantities indicated on the plan, provide quantities as shown on the plan.
- B. Quality:
  - 1. True to type, name and variety, well-formed and shaped, with normal, well- developed branches and vigorous root system.
  - 2. Sound, healthy, vigorous, free from defects, disfiguring knots, sun-scald, abrasions, injuries, diseases, insect eggs, borers and all other forms of infections.
  - 3. Nursery grown in accordance with good horticultural practices.
  - 4. Grown under the same climate conditions as the location of this project for at least two (2) years prior to date of planting on this project.
  - 5. Plants which have been held in storage will be rejected if they show signs of growth during storage.
  - 6. Collected plants shall be taken from subgrade favorable to good root development.
  - 7. All collected material shall be clean, sound stock and shall be free from decaying stumps.
- C. Measurements:
  - 1. Size and grading conform to American Association of Nurserymen's standards unless otherwise specified.
  - 2. A plant shall be dimensioned as it stands in its natural position.
  - 3. For plants specified by a range of sizes, provide plants not less than the minimum size. Not less than 50% of the plants shall be as large as the average size specified.
  - 4. Large plants which have been cut back to the specified sizes will not be accepted.
  - 5. Take caliper measurements 6" above ground line for trees less than 4" caliper, 12" above ground lines for 4" caliper and larger.
  - 6. Provide plant materials which are matched specimens from a single block source.

2.02 MULCH

- A. Natural cypress, shredded, where wood mulch is indicated.
- B. White rolled river gravel rock mulch, where rock or stone mulch is indicated.
- C. Hay or straw, weed free, as specified in Indiana Highway Specifications 913.05.
- D. Peat Moss:
  - 1. Shredded, loose, free of mineral and waste matter.
  - 2. Minimum organic matter by weight, oven-dry: 85%.

3. Ash content: 10% max.
4. Moisture content: 35% max.

- E. Playground Ground Cover Mulch:
1. Non-CCA-containing hardwood mulch.
  2. Rated for use on playground surfaces.

2.03 TOPSOIL

- A. Fertile, friable surface soil, free of materials toxic to plant growth.
1. Classifiable as loam, silt loam, silty clay loam, or clay loam.
  2. PH range of 5.5 - 7.5.
  3. Organic content: 3% min., 20% max. (chromic acid reduction test).
  4. Free of grass, roots, stumps, brush and stone 2" or greater in diameter.

2.04 FERTILIZER AND HERBICIDE

- A. Soil fertilizer: Commercial 12-12-12.
- B. Granular plant food: Commercial 20-10-5.
- C. Planting tablets: Commercial fertilizer plant food tablets, "Agriform": 20-10-5. 5-25 gram weight.
- D. Herbicide: "Ronstar" or equal.

2.05 LANDSCAPE BOULDERS

- A. See Drawings for all sizes and locations of boulders.
- B. Locally quarried and supplied natural stone.
- C. Boulders to be natural form 3' – 4' in size.
- D. Final placement in the field by project architect.

2.06 ACCESSORY MATERIALS

- A. Water: Free of oil, acids, alkalis, salts or any substance injurious to plants.
- B. Tree Paint: Standard horticultural antiseptic compound.
- C. Tree Wrap: Arboricultural wrapping paper, crepe surface, 4" wide, brown color, double layer.
- D. Porous Material: Gravel or coarse aggregate #2 ranging from 1 to 3 inches.
- E. PVC Pipe: 4" perforated or 4" solid.
- F. Miscellaneous Hardware: Eye bolts, cable clamps, turnbuckles, galvanized.
- G. Cable: Galvanized steel, 12 gauge.
- H. Hose: 2-ply reinforced rubber, 3/4" diameter, black or green.
- I. Pressure treated timbers and lumber: Osmose or Cuprinol treatment.
- J. Antidessicant: "Wilt Pruf", as manufactured by Nursery Specialty Products, Inc., or equal.
- K. Borer Control: Conform to article 611.12 of Highway Specifications.
- L. Sand: Medium textured, screened and washed.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Pits and trenches with flat, square bottom, a minimum 6” deeper than balls or roots, such that the root crown of plant is flush with finish grade prior to mulching to prevent crown rot.
- B. Width: Min. 1 ft. greater that diameter of ball or spread of roots of plants; and 2 ft. greater for trees.
- C. Lightly compact the soil well around the rootball of all trees and plants to place them in a straight and true vertical orientation, with the plants self-supporting.
- D. If deciduous trees cannot support themselves upright after planting, wrap and guy trees to secure them in position until they achieve the ability to be self-supporting. Protect all trees with tree stakes. Remove all staking within one year of growth.
- E. Prepare planting mix in pits under plants and as backfill.

3.02 PLANTING

- A. Setting Plants:
  - 1. Locate where indicated on drawing.
  - 2. Set trees plumb and brace in position.
  - 3. Ascertain locations of utility lines, electric cables and conduits, water lines, sprinklers to avoid disturbing subsurface lines and planting.
  - 4. Avoid overhead obstructions to large planting.
  - 5. Remove bindings and wrapping materials from top of balls and around trunks.
  - 6. Do not remove burlap from under balls.
- B. Back Filling:
  - 1. Use topsoil mixture containing 25 % peat moss.
  - 2. Fill all voids carefully.
  - 3. Avoid breaking or bruising roots.
  - 4. Tamp backfill firm to prevent settlement.
  - 5. Construct saucer of clay around plants as detailed.
  - 6. Water thoroughly.
  - 7. Add backfill if settling from watering occurs.
  - 8. Apply herbicide to soil surface after backfilling.
- C. Pruning:
  - 1. Perform pruning by experienced plantsmen using sharp tools.
  - 2. Prune after planting to remove broken or damaged branches and roots.
  - 3. Improperly pruned plants must be replaced.
- D. Mulching:
  - 1. Mulch shrubs to minimum 6” outside drip line of shrubs.
  - 2. Mulch trees and planting beds as shown on drawings.

3.03 PLANTING MAINTENANCE

- A. Begin maintenance immediately after planting and continue through one full growing season.
- B. Reset plants to upright position to proper grade as necessary.
- C. Remove and replace all dead plants.
- D. Water, remulch, fertilize, spray, tighten guy wires as required for keeping plants in healthy growing condition.

3.04 CLEAN-UP

- A. Remove debris and excess material from site.
- B. Clean spills from pavement and finished surfaces.
- C. Repair or replace damaged sodded or seeded areas.

SUBMITTAL CHECK LIST

- 1. Product Data.

END OF SECTION 02950

SECTION 02952 - ALUMINUM MAINTENANCE EDGING

PART 1 – GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, supervision and services as required for all work related to the Aluminum Maintenance Edging as indicated, noted and detailed on the Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 02200 - Earthwork
- Section 02930 - Lawns and Grasses
- Section 02950 - Trees, Plants and Ground Covers

1.03 WARRANTY

- A. 15-year limited warranty from manufacturing defects in materials or workmanship.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Delivery:
  - 1. Deliver in supplier's original unopened package.
  - 2. Pack, transport and handle plants with utmost care to protect against injury.
  - 3. Do not bend, twist or break.

1.05 SUBMITTALS

- A. Product Data:
  - 1. Submit manufacturer's published literature describing products.
  - 2. Submit manufacturer's installation procedures.

PART 2 - PRODUCTS

2.01 MAINTENANCE EDGING

- A. Provide one of the following approved manufactured products:
  - 1. "PermaLoc Corporation", "CleanLine".  
1-800-356-9660
- B. Construction:
  - 1. Constructed for straight-line and gentle curve applications.
  - 2. Corrugated profile with exposed top edge.
  - 3. Shall have loops on side of section to receive stakes spaced approximately 2 feet apart along its entire length.
- C. Material:
  - 1. Extruded aluminum, 6063 alloy, T-6 hardness.
- D. Size:
  - 1. 3/16 inch thickness.
  - 2. 4 inches high.
  - 3. 8 feet and 16 feet lengths.

- E. Connection Method:
  - 1. Section ends shall splice together with a horizontal 1 inch wide x 4 inches long aluminum sliding connector.
  
- F. Stakes:
  - 1. Manufactured and supplied by same manufacturer and product set.
  - 2. 12 inch long standard stake.
  - 3. Stakes to interlock into preformed section loops.
  - 4. Provide longer, heavier gage stakes as required to firmly secure into ground as needed for its permanent intended use.
  
- G. Finish:
  - 1. Mill Finish Natural Aluminum.
  - 2. All edging, stakes, connectors and accessories to receive the same finish.

### PART 3 – EXECUTION

#### 3.01 PREPARATION

- A. Ensure that all underground utility lines are located and will not interfere with the proposed edging installation before beginning work.
  
- B. Locate border line of edging with string or other means to assure border straightness and curves as designed.

#### 3.02 INSTALLATION

- A. All installation procedures shall be per manufacturer's published Manufactured Guidelines.
  
- B. Set edging into trench with the horizontal base resting on compacted sub-base.
  
- C. Top of edging to be maximum of 1/2 inch above compacted finish grade on turf side.
  
- D. Loops for stakes are to be placed on the turf side.
  
- E. Drive stakes through edging loops until locked in place.
  
- F. Requires minimum of 3 stakes evenly spaced for each 8 feet section and 8 stakes evenly spaced for each 16 feet section.
  
- G. At square corners, notch cut the base only and form a continuous corner from a single piece. Do not abut two separate pieces at a corner.
  
- H. At a curved radius, either at corners or at angled runs, cut edging partially up through its height from bottom and turn back to desired angle to form rounded exposed radius.

#### 3.03 BACKFILLING

- A. Backfill both sides of edging.
  
- B. Confirm and adjust if necessary that sections are securely held together.
  
- C. Compact backfill material along edging to provide top of edging at desired height above finish grade of turf.



3.04 CLEAN-UP

- A. Remove debris and excess material from site.
- B. Clean scraps and shavings from site.
- C. Repair or replace damaged sodded or seeded areas.

SUBMITTAL CHECK LIST

- 1. Product Data.

END OF SECTION 02952

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 place all cast-in-place concrete indicated, noted and detailed on the drawings and specified herein, including (but not limited to) reinforcing steel, anchor bolts, forms and form removal.

1.02 RELATED WORK

- Section 02200 – Earthwork  
Section 02750 – Concrete Paving and Curbs

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).
    - 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).
    - e. Recommended practice for Field Evaluation of Compressive Test Results of Field Concrete (ACI-214).
    - f. ACI 302.2: Guide for Concrete Slabs that Receive Moisture-sensitive Floor Coverings.
  2. ASTM Standards (latest editions) for material specifications.
- B. Testing:
1. See Section 01400 - Quality Control.
  2. Pay costs of geotechnical engineer and testing laboratory approved by the Architect/Engineer, tests, inspections and necessary re-testing and re-inspection. Provide a level, safe testing location for each pour.
  3. 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.
  4. 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 48 hours after which they shall be removed to the testing lab by laboratory personnel. The contractor is to provide curing boxes to maintain environmental conditions of test cylinders on site per ASTM C-31.
    - c. Two of the cylinders shall be tested at 7 days and two at 28 days.
    - d. Failure of the concrete to meet the specification requirement's 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.
    - f. FF/FL testing: Provide as indicated elsewhere in Contract Documents. If not otherwise indicated, provide testing on all open sections of level slab.
- C. Allowable tolerances:
1. Formed surfaces: Table 4.3.1, ACI 301.
  2. Floor slabs to be poured and finished to a floor flatness rating of 35 or better and a floor levelness rating of 20 or better.

- D. 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 point destination in conformance to ASTM C94.

1.05 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.
- 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.

PART 2 - PRODUCTS

2.01 MIX DESIGNS

- A. Design mix with appropriate adjustments for air content and aggregate proportions.
- B. Compressive strength at 28 days (minimum) as indicated on structural drawings, or if not indicated, as listed below:
  - 1. 4,000 psi: Footings and foundation walls.
  - 2. 3,500 psi: Interior slabs on grade. Maximum water to cement ratio of 0.50.
  - 3. 4,000 psi: Exterior slabs, pads, walks, steps and stoops.
  - 4. 3,500 psi: Curbs.

- C. Regardless of any contrary notes on Drawings, in no case shall the water to cement (w/c) ratio exceed 0.50 for slabs scheduled to receive floor finishes. Provide admixtures as required for weather conditions at time of pour. If w/c ratio exceeds 0.50 in quality control test, that area of slab must be removed at contractor's expense and a new slab installed which complies with the proper w/c ratio. All admixtures to be included in mix design submittal.
- D. Air Entrainment for concrete exposed to weather:
  - 1. Air content controlled between 4 and 6% by volume.
- E. Slump:
  - 1. Footings: 3 in. +/- 1 in.
  - 2. Foundation Walls: 4 in. +/- 1 in.
  - 3. Slabs: 4 in. +/- 1 in.

## 2.02 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, potable and free from injurious amounts of oil, acids, alkalies, organic matter or deleterious substances.
- 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 C309.
  - 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, Type "S", deformed.
  - 2. Stirrups and Ties: ASTM A 615 Grade 60.

3. Welded Wire Fabric (WWF) or Welded Wire Mesh (WWM):  
ASTM A 185, 6 x 6 W1.4 x W1.4, or as indicated.
4. All splices shall be Class B tension lap splice.

H. Vapor Barrier:

1. 15 mil polyethylene film slab underlay, per ASTM E1745.

I. Expansion Joint filler:

1. Closed cell polyethylene or polyurethane foam.
2. "Sonocrete" by Sonneborn or equivalent.

J. 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.

K. 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.

L. Bond Breakers:

1. Burke Super Bond Breaker or equivalent.

M. Drainage Fill Below Slabs and Footings:

1. Crushed stone or river gravel.

N. Precast Pipe Bollard Cap

1. Symmetrically domed profile utilizing minimum 5000 psi fiber reinforced cementitious material.
2. Approved product: "TopGard" by TopGard, LLC, [www.topgardcap.com](http://www.topgardcap.com) (317) 525-0700

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 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. Non-staining.
  2. Apply before reinforcing steel is placed.
- F. Tolerances:
  1. ACI 347.

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.
- 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. Damp proof slab on grade with film underlay between fill and concrete.
  - 2. Lap ends and edges minimum 6" in direction of pour.
  - 3. Install in accordance with ASTM E1643.
  - 4. Provide temporary overlayments as required to protect vapor barrier during slab installation.
  - 5. Installation of vapor barrier under a layer of granular fill may be acceptable in lieu of installation directly under slab, upon written approval of Architect. If vapor barrier is installed under granular fill, vapor barrier must be turned up at edges to prevent vapor migration horizontally. Special precaution must be taken to prevent granular fill layer from becoming saturated prior to pouring slab. Comply with ACI 301 recommendations for installation of vapor barrier using this method.
- H. Verify reinforcement and anchors, expansion joint material and embedded items are secured in position.
- I. Slabs and footings shall have no horizontal joints.  
Any stop in concrete work shall be made with keyed vertical bulkheads.  
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. Contractor is responsible for determining maximum floor moisture levels and ph levels acceptable to floor finish manufacturers and installers. Schedule concrete floor slab pours to allow adequate time for moisture to evaporate prior to installing finish flooring. Provide concrete with a water to cement ratio of less than 0.50, and allow minimum 3 months curing time before installing floor finish materials. 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 PLACING

- 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 placement.
- E. Do not use retempered concrete or concrete partially hardened or contaminated with foreign material.
- F. Ensure forms and conveyance equipment is clean and free of ice, water, debris and hardened concrete.
- G. Floor slabs to be poured and finished to a floor flatness rating of 35 or better and a floor levelness rating of 20 or better.
- H. All vertical concrete surfaces shall be formed, including all footings.
- I. Provide shear keys in the top of all wall and column footings at concrete walls.
- J. Minimum depth for all footings for exterior walls to be 24" below finish grade.
- K. All stoops and patios to slope away from doors at minimum 1/8" per foot and maximum 1/4" per foot.

### 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 slabs.
  - 2. 1-1/2" for walls.
  - 3. 3" for footings.

3.04 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.

3.05 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. The surface of the slab may be sprayed with water at any time during floating and finishing, provided the water is removed before the next machine operation. Do not machine slabs that have the surface glossed by water.
- D. A high-pressure hose and a bump cutter or drag hose must be available at all times during finishing.
- E. Where broom finish is indicated, broom finish by drawing broom across surface, transversely after hard troweling (not just floating).

3.06 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 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.

3.07 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.

3.08 PATCHING

- A. Do not patch any surface until examination is made by the Architect and permission is given.

3.09 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.

3.10 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 smooth dowelled joints between all cast sections of slabs on grade as indicated on Drawings, or if not indicated, using #4 smooth rebar at 12" o.c. with one end greased. Use of diamond dowels is permitted only upon written approval of Architect.
- C. Control Joints:
  - 1. Depth: For slabs up to 9" thick, 1" minimum depth using early entry dry cut saws. For slabs thicker than 9", contact Architect for direction on deeper joints.
  - 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) 8" slab = 17'-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 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. Saw cut joints of slabs and walks shall be made using the early entry dry-cut method.
  - 5. Where early entry dry cut method cannot be used, saw cut using wet cut method within 24 hours of placing.
  - 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. Comply with sealant manufacturer's recommendations.

E. Carry reinforcement across joints in slabs except at expansion joints.

3.11 BOLLARD CAP

A. After filling pipe bollard with concrete, install precast bollard cap while concrete is still wet.

SUBMITTAL CHECK LIST

1. Concrete Mix Designs.
2. Reinforcement Steel Shop Drawings.

END OF SECTION 03300

SECTION 03540 - SELF-LEVELING CONCRETE FLOOR UNDERLAYMENT

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, material, equipment, special tools, supervision, and services required to prep substrate and properly place self-leveling concrete floor underlayment as indicated on drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 09300 – Tile

1.03 QUALITY ASSURANCE

- A. Installer's Qualifications: Installation of underlayment shall be by an applicator authorized by the manufacturer using manufacturer's approved mixing and pumping equipment.

1.04 DELIVERY, STORAGE AND HANDLING

- A. General Requirements: Materials shall be delivered in their original, unopened packages, and protected from exposure to the elements. Damaged or deteriorated materials shall be removed from the premises.

1.05 SITE CONDITIONS

- A. Environmental Requirements: Before, during and after installation of underlayment, building interior shall be enclosed and maintained at a temperature above 50 degrees F (10 degrees C) and below 100 degrees F (37.7 degrees C) until structure and subfloor temperature are stabilized.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Cementitious Self-Leveling Poured Floor Underlayment: Floor underlayment compound to be Level-Right Self-Leveling Floor Underlayment as manufactured by Maxxon Corporation or approved equivalent.
- B. Sand Aggregate: Sand shall be silica aggregate meeting requirements of manufacturer.
- C. Mix Water: Potable, free from impurities.
- D. Subfloor Primer: Underlayment manufacturer's recommended primer as required.
- E. Sealer: Underlayment manufacturer's recommended sealer as required.

2.02 MIX DESIGNS

- A. General Requirements: Underlayment mix proportions and methods shall be in strict accordance with product manufacturer recommendations.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Condition and Cleaning of Subfloor: Subfloor shall be structurally sound. Contractor shall clean subfloor to remove mud, oil, grease, and other contaminating factors.

- B. Leak Prevention: Fill cracks and voids with a quick setting patching or caulking material where leakage of underlayment could occur.
- C. Priming Subfloor: Prime concrete subfloor using the manufacturer's recommended primer. Priming instructions vary according to the porosity of the concrete, multiple coats may be necessary.
- D. Expansion Joints: Allow joints to continue through the underlayment at the same width.

3.02 APPLICATION OF SELF-LEVELING UNDERLAYMENT

- A. Scheduling: Application of underlayment shall not begin until the building is enclosed, including roof, windows, doors, and other fenestration.
- B. Application: Place underlayment from 3" (76 mm) to featheredge. Spread and float to a smooth surface. Except at authorized joints, place underlayment as continuously as possible until application is complete so that no slurry is placed against underlayment that has obtained its initial set.
- C. Drying: Contractor shall provide continuous ventilation and adequate heat while curing.

3.03 PREPARATION FOR INSTALLATION OF FLOORING

- A. Sealing:
  - 1. Seal all areas according to manufacturer's recommendations.
  - 2. Verify sealer compatibility with flooring adhesives prior to installation.
- B. Refer to manufacturer's guidelines for additional information regarding flooring installation.

3.04 FIELD QUALITY CONTROL

- A. Slump Test: Underlayment mix shall be tested for slump as it is being pumped using a 2 inch by 4 inch (50 mm by 101 mm) cylinder resulting in a patty size of 9 1/2 inches (241 mm) plus or minus 1 inch (25 mm) diameter.
- B. Field Samples: At least one set of 3 molded cube samples shall be taken from each day's pour during the underlayment application. Cubes shall be tested as recommended by the manufacturer in accordance with modified ASTM C 109. Test results shall be available to architect and/or contractor upon request from applicator.

3.05 PROTECTION

- A. Protection From Heavy Loads: During construction, place temporary wood planking over underlayment wherever it will be subject to heavy wheeled or concentrated loads.

END OF SECTION 03540

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 04210 - Face Brick Masonry  
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, alkalies, organic matter or deleterious substances.
- E. Water Repellent:
  - 1. Provide one of the following approved products:
    - a. "Grace Construction Products"; Dry-Block.
    - b. "BASF"; Rheopel Plus.
    - c. "ACM"; RainBloc.
    - d. "Krete"; HQ.
  - 2. Use for all mortar on exterior concrete masonry walls.
- F. Silo Batch Plant:
  - 1. As approved by the Architect.

## 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 exterior masonry walls.
  - 3. For use at all at grade and below grade masonry walls.
  - 4. For use at all interior, reinforced masonry walls.
- C. Type N Mortar:
  - 1. 750 psi minimum, medium compressive strength tested in accordance with ASTM C270.
  - 2. For use at all interior, non-reinforced masonry walls.
  - 3. For use at all exterior veneers, brick and stone.
- D. No chemical admixtures shall be added to the mortar without the express permission of the Architect.
- E. Mortar Color:
  - 1. Match existing.

## 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.
- C. Add water repellent to mortar per manufacturer's instruction.

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.
- 2. Color samples.

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 04210 - Face Brick Masonry  
Section 04220 - Concrete Unit Masonry  
Section 04510 - Masonry Protection and Cleaning  
Section 07650 – Flexible Flashing

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, cutsheets 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. Prefomed elastomeric rubber, with shear keys and flanges.
- C. Veneer Wall Ties:
  - 1. At veneer cavity walls with concrete masonry back-up (without continuous insulation):
    - a. See Specification 04160 - Masonry Reinforcement.
- D. Column Anchors:
  - 1. Provide one of the following approved products:
    - a. "H&B", #359-FH Weld-On Tie with #302W Column Web Tie.
  - 2. Hot dipped galvanized.
- E. Beam Anchors:
  - 1. Provide one of the following approved products:
    - a. "H&B", #357.
  - 2. Hot dipped galvanized.
- F. Mortar/Grout Screen:
  - 1. Provide one of the following approved products:
    - a. "H&B", #MGS.
  - 2. 1/4" square microfiliment screen.
  - 3. Polypropylene polymer, non-corrosive.
- G. 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.
- H. 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. (See Section 07650 Flexible Flashing for thru-wall flashing requirements.)

- 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 multi-wythe adjustable systems:
  - 1. "H&B", #170, Truss Lox-All Adjustable Eye-Wire.

2.04 CAVITY WALL REINFORCEMENT

- A. Description:
  - 1. Brick and Block Veneer: Hot dipped galvanized.
  - 2. Prefabricated from cold-drawn steel wire complying with ASTM A82.
  - 3. 2-piece design comprised of a continuous joint reinforcement member, of a truss or ladder design, and a veneer wall tie that interlock together via an integral eye wire hook and loop.
  - 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. Continuous Joint Reinforcement Member:
  - 1. 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 or ladder design.
  - 2. Integral projecting eyes factory welded to the continuous joint reinforcement. Length of projecting arms for eyes to be as required for thickness of wall cavity construction.
- C. Veneer Wall Ties:
  - 1. U-shaped ties with hooked open ends to interlock into eyes on continuous joint reinforcement member.
- D. Provide one of the following approved products:
  - 1. "H&B", Lox-All, Adjustable Eye Wire, Truss Type #170, with adjustable ties.
  - 2. "H&B", Lox-All, Adjustable Eye Wire, Ladder Type #270, with adjustable ties.

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 04210 - FACE BRICK MASONRY

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, supervision and services required to complete brick masonry work.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 04100 - Mortar  
Section 04150 - Masonry Accessories  
Section 04160 - Masonry Reinforcement  
Section 04510 - Masonry Protection & Cleaning  
Section 07650 - Flexible Flashing

1.03 QUALITY ASSURANCE

- A. Qualifications:
1. Employ masons skilled and experienced in the setting of brick.
  2. Only first-class brickwork will be accepted.
- B. Mock-Up Panel:
1. Construct on site sample panel 4 foot wide x 4 foot high, of typical wall thickness and construction.
  2. Show proposed color range, texture, bond, mortar color, mortar joint and workmanship of masonry materials.
  3. Do not proceed with masonry work until sample panel has been approved.
  4. Use panel as standard of comparison for all masonry work.
  5. Do not destroy or remove panel until all masonry work is complete and accepted.

1.04 SUBMITTALS

- A. Samples:
1. If specific brick has been specified: **Face brick shall match existing.**  
Masonry contractor to submit brick panels or 5-brick pallet samples for final approval by Architect. Color, texture and range of brick to be submitted as specified.
  2. If specific brick has not been specified:  
Masonry contractor to select and submit brick panels or 5-brick pallet samples for final selection by Architect. Color, texture and range of brick to be submitted to be per direction of the Architect.
  3. Brick submitted shall conform to these specifications and be within color and texture range specified.
  4. Selected brick samples shall have mock-up panels constructed for final selection and approval.
  5. Lay additional sample panels as directed by Architect
  6. Architect reserves the right to select any brick from any supplier.
- B. Test reports indicating compressive strength, water absorption, saturation and suction.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Store brick off ground to prevent contamination by mud, dust or materials likely to cause staining or other defects.
- B. Cover materials as necessary to protect from elements.

PART 2 - PRODUCTS

2.01 FACE BRICK

- A. Size:
  - 1. Typical standard Modular units: 8 inches long x 2-1/4 inches high x not less than 3-5/8 inches deep.
- B. Special Shapes:
  - 1. Cut standard unit with power saw or provide units manufactured to sizes or shape required.
  - 2. Provide solid brick, watertable profile, finished ends, special sizes, etc. as required.
  - 3. Special shape items to match selected brick in every other respect.
- C. Conform to ASTM C 216, Grade SW, Type FBS.
- D. Brick submitted shall be from brick manufacturers who are able to provide certification and physical evidence that the brick has been successfully used in projects of similar exposure for at least three complete climatic cycles without physical or visual changes.
- E. Do not exceed variations in color and texture of accepted samples and mock-up.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verify initial absorption rate of brick is within acceptable limits.
- B. Reduce initial absorption exceeding 20 g./30sq. in/min by thoroughly wetting with clean water 24 hours prior to placement.

3.02 INSTALLATION

- A. General:
  - 1. Lay brick plumb and true to lines.
  - 2. Cut exposed brick with masonry saw.
  - 3. Anchor brick veneer to backing with metal reinforcement.
  - 4. Where fresh masonry joins partially set masonry.
    - a. Remove loose brick and mortar.
    - b. Clean and lightly wet exposed surface of set masonry.
  - 5. Stop off horizontal run of masonry by racking back 1/2 length of unit in each course.
  - 6. Tooling is not permitted except upon written acceptance of the Architect.
- B. Weep Holes:
  - 1. See Section 04150 - Masonry Accessories.
  - 2. Keep weep holes and area above flashing free of mortar droppings. Coordinate with thru-wall flashing.
- C. Sealant Recesses:
  - 1. Retain joints around outside perimeters of exterior doors, windows frames and other wall openings.
  - 2. Depth: Uniform 3/4 inch.
  - 3. Width: 3/8 inch.
- D. Movement Joints:
  - 1. Keep clean from all mortar and debris.
  - 2. Locate as shown on drawings.

E. Sealant:

1. See Section 07900-Joint Sealers for all labor and material for sealing perimeter recesses and joints.

3.03 PROJECT CONDITIONS

A. Staining: Prevent grout or mortar from staining the face of masonry to be left exposed or painted.

1. Remove immediately grout or mortar in contact with face of masonry.
2. Protect sills, ledges and projections from mortar droppings.
3. Protect door jambs and corners from damages during construction.

B. Cold Weather Protection:

1. Preparation:

- a. If ice or snow has formed on masonry bed, remove by carefully applying heat until top surface is dry to the touch.
- b. Remove all masonry deemed frozen or damaged.

2. Products:

- a. When brick suction exceeds 20 g/30 sq. in./min., sprinkle with heated water.
  - 1) When units are above 32°F, heat water above 70°F.
  - 2) When units are below 32°F, heat water above 130°F.
- b. Use dry masonry units.
- c. Do not use wet or frozen units.

SUBMITTAL CHECK LIST

1. Brick Samples.
2. Test Reports.
3. Mock-up Panel.

END OF SECTION 04210



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
- Section 07650 - Flexible Flashing

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, cutsheets, literature, specifications and installation instructions.
  - 2. Test data for unit strength.
- B. Color Samples:
  - 1. If color is indicated, submit actual sample of finish selected for final review and approval.
  - 2. If not indicated, color to be selected by Architect from manufacturer's entire selection.
  - 3. Submit actual samples for review and approval if requested.

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:
  - 1. Standard natural, non-colored concrete masonry unit.
  
- E. Provide one of the following approved products:
  - 1. "4D/Schuster's (Oldcastle)"; Custom Architectural Masonry Units.
  - 2. "General Shale"; Custom Architectural Masonry Units.
  - 3. "L. Thorn Brick and Block"; Custom Architectural Masonry Units.
  - 4. "Masolite"; Concrete Masonry Units.

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:
  - 1. Stack bond on all exposed walls, unless otherwise indicated.
  - 2. Running bond allowed where unexposed.
- B. Tooling:
  - 1. 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.

### 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 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 (New Construction Only)

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 new masonry work.

1.02 RELATED WORK

Section 04100 - Mortar

Section 04210 - Face Brick Masonry

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. Brick, Concrete Block, Tile:
  - a. "ProSoCo", Sure Klean #600.
  - b. "ProSoCo", Sure Klean #101 Lime Solvent (Red and Dark Colored Brick and Surfaces).
  - c. "ProSoCo", Sure Klean #800 Stain Remover (Buff or White Brick).
  - d. "ProSoCo", Enviro Klean Safety Klean.
  - e. "Sonneborn", Sonokleen 88.
  - f. "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 05100 - STRUCTURAL STEEL

PART 1 – GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, supervision and services required to fabricate, deliver and erect all structural steel indicated, noted and detailed on the drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 03300 - Cast-In-Place Concrete  
Section 05210 - Steel Joists  
Section 05300 - Metal Roof Decking  
Section 05500 - Miscellaneous Metals

1.03 QUALITY ASSURANCE

- A. All shop and field welders must hold a current and valid certificate issued by the American Welding Society. Certificates shall be carried and presented upon request of Architect/Engineer.

1.04 REFERENCE

- A. Publications of the following institutes, associations, societies and agencies are referred to in this Section.
1. American Society for Testing & Materials, ASTM.
  2. American Institute of Steel Construction, AISC.
  3. Steel Structures Painting Council, SSPC.
  4. American Welding Society, AWS.
- B. Comply with the applicable portions of the following publications.
1. "Manual of Steel Construction", AISC.
  2. "Specifications for Design, Fabrication, and Erection of Structural Steel for Buildings", AISC.
  3. "Structural Steel Detailing", AISC.
  4. "Specifications for A-36 and A-50 Steel Arc Welding Electrodes", AWS.
  5. "Code for Arc Welding in Building Construction", AWS.
  6. "Steel Structures Painting Manual", SSPC Vol. 2.
  7. "Riveted and Bolted Structural Joints", AISC.
  8. "Specifications for Structural Joints Using ASTM A325 and A490 Bolts", AISC.
- C. All structural steel and accessories shall be domestic products. Imported products will not be approved or used.

1.05 SUBMITTALS

- A. Furnish to the Architect/Engineer for his approval complete shop and field erection drawings.
1. Submit drawings prior to fabrication and erection of structural steel.
  2. Base drawings on AISC Publication "Structural Steel Detailing".
  3. All connections not sized on drawings to be designed by licensed professional engineer, and certified designs to be indicated on shop drawings.
  4. Include complete details and schedules for the fabrication of each member.
  5. Include complete details, schedules, procedures and diagrams showing sequence of erection.
  6. Each member shown on the shop drawings shall be marked in such a manner that the member designations on the drawings coincide with the member designations on the member in the field.
  7. Complete anchor bolt setting plan for use in setting anchor bolts and leveling plates.
- B. Furnish the Architect/Engineer with the following certificates.
1. AWS Certification of all welders who will perform work on this project.



2. Certification form supplier that structural steel furnished for this project conforms to this specification.

1.06 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 damage to materials or structure.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Structural Steel:
  1. ASTM Specification A36 (36 KSI) except as follows:
    - a. Tubular Steel:
      1. ASTM Specification A500 Grade B (46 KSI) (Cold Formed) or A501 (Hot Formed)
    - b. Steel Pipe:
      1. ASTM Specification A500 Grade B, (42 KSI).
    - c. Wide Flange Shapes:
      1. ASTM Specification A992 (50 KSI).
- B. Paint For Shop Application:
  1. Prime with Type 1, oil alkyd, red oxide to minimum 2 mil dry thickness.
- C. High-Strength Bolts, Including Nuts and Washers:
  1. ASTM Specification A325.
  2. Heavy hexagon structural bolts, heavy hexagon nuts and washers as required, unless otherwise indicated.
  3. Washers for high strength bolts shall be flat circular hardened steel washers conforming to ASTM F436.
- D. Welded Headed Studs Used As Concrete Anchors:
  1. Shall be 1/2" diameter x 4" A.W.L., unless otherwise noted.
  2. Low carbon steel solid fluxed studs complying with ASTM A-108 with a minimum Fu = 60 KSI.
  3. Shall be automatically end welded.
- E. Bolts and Nuts, Other Than High-Strength:
  1. ASTM Specification A307, Grade A.
- F. Plain Washers, Other Than Those In Contact With High-Strength Bolt Heads and Nuts):
  1. ASNI Standard B18.22.1, Type B.
- G. Anchor Bolts:
  1. Comply with ASTM F1554 Grade 36.
  2. Non-headed type with heavy hexagon structural nuts and washers as required, unless otherwise indicated.
- H. Electrodes for Welding:
  1. Comply with AWS Code, using ASTM A233 E-70 series covered mild steel electrodes.

- I. Non-Shrink Grout:
  - 1. Design is based on use of "Embeco" high-strength non-shrink grout manufactured by Master Builders.
  - 2. Non-Shrink grout shall be that upon which design is based or an equal approved by the Architect.
- J. Remove all rolling and mill identification marks on all exposed members.

#### 2.02 FABRICATION

- A. Rolled steel to shapes indicated with straight lines, sharp angles and smooth curves. Finished members to be true to line and free from twists, bends and open joints. Properly mark and match-mark all materials for field assembly.
- B. Fitting:
  - 1. Bearing surfaces: Planed to true beds.
  - 2. Abutting surfaces: Closely fitted.
- C. Use standard AISC framed connections using ASTM A325 bolts for attaching beams to columns except as otherwise shown. Develop design capacity of beam if not otherwise specified.\
- D. Holes for turned bolts: 1/6 in. larger than external diameter of bolt.
- E. Weld all shop connections except where otherwise shown or specified. Grind smooth all welds exposed in finished areas.

#### 2.03 SHOP PAINTING

- A. Clean structural steel of rust, scale, oil, grease or other foreign matter in accordance with SSPC Specifications SP3.
- B. After cleaning apply one shop coat of primer.
  - 1. Apply shop coat of Type 1, oil alkyd, red oxide to minimum 2 mil dry film thickness
  - 2. Field touch-up all damaged paint areas using primer paint furnished by the fabricator. Touch-up includes bolts.
- C. All exterior structural steel exposed to weather shall be hot dipped galvanized.
  - 1. Hot dip galvanize per ASTM A123, minimum 2.0 ounces per square foot.
  - 2. Touch-up primer: SSPC 20, Type III inorganic zinc rich, 95% weight of dry film.

#### 2.04 COOPERATION

- A. Provide holes and connections required for other branches of the work where indicated. Secure from other trades associated on the project all necessary drawings and/or templates showing exact location and details required.
- B. Coordinate elevations with joint supplier.

### PART 3 - EXECUTION

#### 3.01 FIELD MEASUREMENT & COORDINATION

- 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.

- B. Coordinate the installation of all holes, slots, anchoring assemblies and other necessary devices required by other sections of this specification. Do not install or attach such material which is acknowledge by AISC, ASTM, SSPC, AWS or manufacturer=s literature to be detrimental to the strength and durability of the structural steel. Do not make any such installations without prior review by the Architect/Engineer. Cutting, burning, drilling or punching of the steel in the field will not be permitted unless approved by the Architect/Engineer.

### 3.02 ERECTION

- A. Accurately set structural steel in accordance with approve shop and erection drawings to the lines and elevations indicated or noted with a maximum tolerance of 0.002 foot for 1/500.
- B. Grout under base plates and at other connections as shown on the Contract Drawings using non-shrink grout as specified herein. Grout under column base plates and secure hold down nuts before any other members are connected to columns.
- C. Install anchor bolts and other connectors required for securing structural steel to foundations and other in-place work.

### 3.03 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 A325 or A490 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 A325 or A490 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". Simple span connections for beams shall be designed for one-half the beam load capacity as given in the AISC "Uniform Load constants for Beams Laterally Supported" Tables.
- G. Length of connection angles or plates for beam-to-column connections shall be the largest standard length less than or equal to the "T" dimension of the beam. Standard lengths of connection angles are found in "A.I.S.C. Manual of Steel Construction, Framed Beam Connections, Table II".
- H. All connections not shown on the drawings shall be designed by a Structural Engineer registered in the state where the structural steel is to be erected, retained by the steel fabricator. All calculations and shop drawings shall be duly stamped by the Registered Structural Engineer and submitted for review by the Structural Engineer. Stamping of shop drawings shall be for the exclusive purpose of certifying that the connections are detailed as per the design performed by the Registered Structural Engineer. Failure to submit stamped shop drawings and stamped calculations shall be sufficient cause for rejection of shop drawings. The Contractor shall be liable for the dimension, fit, tolerances, fabrication and erection.

- I. 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 Engineer with documents establishing the qualifications of welders involved in the work.
- J. 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.
- K. All welds shall be pre-qualified in accordance with AWS D1.1.
- L. After erection and inspection, welded and bolted connections and abraded areas shall be thoroughly cleaned and covered with "Shop Coat" paint applied by this contractor.

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 WELDING INSPECTION

- A. The Inspector(s) shall be an AWS Certified Welding Inspector (CWI) qualified and certified in accordance with the provisions of AWS QC1, Standard for Qualification and Certification of Welding Inspectors.
- B. The Inspector shall ascertain that all fabrication and erection by welding is performed in accordance with the requirements of the contract documents.
- C. The Inspector shall make certain that all welding procedures are pre-qualified.
- D. The Inspector shall inspect the welding equipment to be used for the work to make certain that it conforms to the requirements of AWS D1.1.
- E. The Inspector shall require re-qualification of any welder or welding operator who has for a period exceeding six months not used the process for which the welder or welding operator was qualified.
- F. The Inspector shall make certain that the size, length, and location of all welds conform to the detail drawings and that no unspecified welds have been added without approval.
- G. The Inspector shall make certain that only welding procedures are employed which meet the provisions of AWS D1.1.
- H. The Inspector shall make certain that electrodes are used only in the positions and with the type of welding current and polarity for which they are classified.
- I. The Inspector shall, at suitable intervals, observe joint preparation, assembly practice, the welding techniques, and performance of each welder, welding operator, and tacker to make certain that the applicable requirements of AWS D1.1 are met.
- J. Inspectors shall identify with a distinguishing mark or other recording methods all parts of joints that they have inspected and accepted.
- K. The Inspector shall keep a record of qualifications of all welders, welding operators, and tackers, and all procedure qualifications or other tests that are made and such other information as may be required.

- L. The contractor shall be responsible for visual inspection and necessary correction of all deficiencies in materials and workmanship in accordance with the requirements of AWS D1.1.
- M. The contractor shall comply with all requests of the Inspector(s) to correct deficiencies in materials and workmanship as provided in the contract documents.
- N. In the event that faulty welding or its removal for re-welding damages the base metal so that in the judgment of the Engineer its retention is not in accordance with the intent of the contract documents, the contractor shall remove and replace the damaged base metal.
- O. All structural welds shall be visually inspected and all complete penetration welds shall be ultrasonically tested by a qualified inspector. Joint fit-up of all complete penetration and partial penetration welds shall be inspected and approved by a qualified inspector prior to making the first pass.

SUBMITTAL CHECK LIST

- 1. Shop Drawings.
- 2. Material certification stating source of steel.
- 3. Certificates of Welders.

END OF SECTION 05100

SECTION 05210 - STEEL JOISTS

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 open-web steel joists and girders, 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 05300 - Metal Roof Decking  
Section 05500 - Miscellaneous Metals

1.03 QUALITY ASSURANCE

- A. All shop and field welders must hold a current and valid certificate issued by the American Welding Society. Certificates shall be carried and presented upon request of Architect/Engineer.

1.04 REFERENCES

- A. Publications of the following institutes, associations, societies and agencies are referred to in this Section.
1. American Society for Testing Materials (ASTM).
  2. Steel Joist Institute, SJI.
  3. American Welding Society, AWS.
  4. American Institute of Steel Construction, AISC.
  5. Steel Structures Painting Council, SSPC.
- B. Comply with the applicable portions of the latest additions of the following codes, specifications, standards and publications:
1. "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings", AISC.
  2. "Standard Specifications, Load Tables and Weight Tables for Steel Joist Girders", SJI.
  3. "Structural Welding Code ", AWS.

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 joist layout, location, size, quantities, type, marking, dimensions, spacing, erection details, connection details and bridging details.
  3. Indicate methods of anchoring, fastening, bracing and attachment.
  4. Each member shown on the shop drawings shall be marked in such a manner that the member designations of the drawings coincide with member designations on the member in the field.
  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 and fabrication of the steel joists and joist girders.
  6. Connection details not indicated on the drawings to be designed by a licensed professional engineer, and certified designs to be indicated on shop drawings.

- B. Certifications:
  - 1. All steel joists shall be produced by an S.J.I. member.
  - 2. All shop drawings shall bear the seal and signature of an engineer registered 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.
  - 3. 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 erection.
- 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. Provide products of one of the following or an approved equivalent:
  - 1. The Ceco Corporation.
  - 2. Armco, Inc.
  - 3. Vulcraft Division of Nucor Corporation.
  - 4. John W. Hancock, Jr., Inc.
  - 5. Valley Joists Division of EBSCO Industries, Inc.

2.02 MATERIALS

- A. Materials shall conform to the following requirements:
  - 1. "Structural Steel", ASTM Designation A36.
  - 2. "High Strength, Low-Alloy Structural Manganese Vanadium Steel", ASTM Designation A441.
  - 3. "High Strength Low-Alloy Structural Steel", ASTM Designation A242.
  - 4. "Steel Sheet and Strip, Hot-Rolled and Cold-Rolled, High Strength, Low-Alloy with Improved Corrosion Resistance", ASTM Designation A606.
  - 5. "Steel, Cold-Rolled Sheet, Carbon, Structural", ASTM Designation A611.
  - 6. "Mild Steel Arc-Welding Electrodes", AWS Bulletin.
- B. Yield point of steel for chord and web sections: as specified in the "Standard Specifications", SJI.
- C. Welding electrodes:
  - 1. E60 Series, Grade SAW-1 for 36,000 psi yield point.
  - 2. E70 Series, Grade SAW-2 for yield point greater than 36,000 psi.
- D. Shop Paint: Type 1, oil alkyd, red or gray oxide to minimum 2 mil dry film thickness

2.03 FABRICATION

- A. Design of steel joists and joist girders shall be the sole responsibility of the contractor, joist manufacturer and joist engineer.
- B. Completely shop fabricate joists including punching for attachments.
- C. Fabricate in accordance with "Standard Specifications", SJI.
- D. Joists 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.

- E. Joists 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.
- F. Joist girders shall be designed by the joist manufacturer for the loads as indicated on the drawings and in accordance with the specifications of the Steel Joist Institute, with the following additional requirements:
  - 1. The maximum deflection due to design live load of 30 PSF shall not exceed 1/360 of the span length.
  - 2. Joist girders shall have approximate cambers as recommended by the standard specifications for joist girders.
- G. Joist manufacturer shall design roof joists for a net uplift (due to wind loading) of 10 PSF. Diagonal bridging or bracing to laterally brace the bottom chord shall be provided as required.
- H. Steel joists and joist girders 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.
- I. 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.
- J. Provide misc. angle framing between joists as required at all roof drains and misc. roof penetrations.
- K. Provide all indicated or required accessories.
  - 1. Bridging:
    - a. Horizontal bracing for l/r ratio of not more than 300.
    - b. Connect to chords by positive mechanical means or by welding.
  - 2. End anchorage for masonry supports for K series joists: equivalent of 3/8 inch round steel bar 8 inch long.
  - 3. Weld roof joist bearing on masonry walls to separate steel bearing plates furnished and installed by others.
  - 4. Connect K Series joists bearing on steel to same with two 1/8 inch fillet welds 3 inch long or as indicated.
  - 5. Side wall anchors: extended zee.
  - 6. Headers: standard with the manufacturer. Furnish as required.
  - 7. Ceiling extensions: bottom chord extended.

#### 2.04 SHOP PRIMING

- A. Before shop priming, clean surfaces free from rust, scale, grease and oil in accordance with SSPC Specifications SP3.
  - 1. Joist shall be sprayed or dipped with one shop coat of primer paint, standard with the manufacturer, to a minimum dry film thickness of 2 mils.
  - 2. Primer to be Standard Type 1, red oxide "10-99" or equivalent.

### 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 BEARING AND ANCHORAGE

- A. Minimum bearing for joists on structural steel members and steel bearing plates shall be 2-1/2 inches.
- B. Minimum bearing for joists on masonry without steel bearing plates shall be 4 inches.
- C. Ends of joists bearing on steel supports shall be connected thereto with two 1/8 inch fillet welds 3 inches long, unless otherwise shown or noted.
- D. Ends of joists bearing on masonry shall be anchored thereto with standard masonry anchors approved by the Architect, unless otherwise shown or noted.
- E. Set joists at proper elevations with required bearing and spacing as indicated on the drawings.

3.03 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 joists immediately after erection and before any construction loads are applied on the joists.
- C. Anchor the ends of bridging lines terminating at all beams and masonry walls at top and bottom chords. Anchored by strap anchors attached directly to the wall.
- D. Bridging shall support top chords against lateral movement during construction period and hold joists in vertical plane.

3.04 ERECTION

- A. Anchor joists parallel to walls with side wall anchors securely built into the masonry at each end of bridging lines.
- B. Install headers as required or indicated.
- C. Provide temporary flooring, bracing, shoring, rails, guards and covers as necessary to prevent injury or damage.
- D. Temporarily fasten partially erected steel joists during interruptions in erecting.
- E. 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.
- F. Place and secure steel joists as shown on plans in accordance with A.I.S.C. and SJI Specifications and as specified herein.
- G. Install joists straight, plumb and properly aligned.
- H. 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.

3.05 CLEAN-UP

- A. Remove dirt, stains and other foreign material caused by erection of steel joists from adjacent surfaces.
- B. Remove dirt and other foreign matter from steel joists and leave in clean satisfactory condition to receive specified finish. If joists are not to receive finish, then leave joists clean and free of dirt and extraneous materials.
- C. Remove and replace joists that cannot be cleaned satisfactorily.

3.06 TOUCH-UP

- A. At completion of erection, touch-up scratched, skinned or abraded spots as required.

SUBMITTAL CHECK LIST

- 1. Complete shop fabrication drawings.
- 2. Complete erection drawings.
- 3. Engineer's certification.
- 4. Materials certification including origin of steel.

END OF SECTION 05210

SECTION 05300 - METAL ROOF DECK

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, supervision and services required to fabricate, deliver and erect all metal decking, including accessories as indicated, notes and detailed 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 following publications:
1. “Specifications for design of Light Gauge Cold Formed Steel Structural Members”, AISC.
  2. “Steel Roof Deck Design Manual”, SDI.
  3. “Basic Design Specifications”, SDI.
  4. Factory Mutual Data Sheets.

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. Import products will not be approved or used.

1.05 SUBMITTALS

- A. Furnish to the Architect/Engineer for his review complete shop and field erection drawings.
1. Indicate location, marking, quantities, materials, gauges and sizes. Indicate by dimensions, locations and sizes of holes to be cut, type of closures and fittings.
  2. Indicate method of connecting, anchoring, fastening and attachment of work of other trades.

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. Roof Deck.
1. Inryco, Inc.
  2. Vulcraft
  3. Rollform Products, Inc.
  4. Wheeling Corrugating Company

- B. Mechanical Fasteners:
  - 1. Buildex, Inc.
  - 2. Hilti

2.02 MATERIALS

- A. Sheets For Decking: Conform to ASTM Designation A653-94 with minimum yield of 33,000 psi, and working stress not to exceed 20,000 psi.
- B. Minimum section modulus shall be 0.234 in.<sup>3</sup>.

2.03 FABRICATION

- A. Form deck units with fluted rib and rolled from sheets.
  - 1. 20 gauge fluted section.
  - 2. 36" wide and of sufficient length for a minimum three span condition.
  - 3. 1-1/2" deep with flutes spaced at 6" o.c. (Type B)
  - 4. Intermediate rib design in accordance with latest edition of Steel Deck Institute Design Manual.
  - 5. Finish: Galvanized (G90).
- B. Provide and install accessory items as required to complete installation.
  - 1. 18 gauge galvanized steel bent plates and closures.
  - 2. 14 gauge roof sump pans at each roof drain.
  - 3. Galvanized sheet steel.
  - 4. Steel supports for roof openings over 12" dimension.

PART 3 - EXECUTION

3.01 MEASUREMENT

- 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 ERECTION

- A. 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.
- B. If connection notes and details are not indicated on the drawings, secure decking to supporting steel members by use of mechanical fasteners or welding per Factory Mutual requirements.
- C. End Laps: 2" minimum and occur over supports.
- D. Side Laps:
  - 1. Make by "nesting" to interlock with adjacent sheets.
  - 2. Attach edges with mechanical fastener supports.
- E. 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" x 12" will be permitted without support by structural steel framing.

- F. 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.

3.03 TOUCH-UP

- A. Touch-up all scratched, abraded or rubbed spots with galvanized or primer paint.

3.04 CLEAN-UP

- A. Remove foreign matter and clean decking to satisfactory conditions to receive specified finish.

SUBMITTAL CHECK LIST

- 1. Shop drawings of layout and installation details.

END OF SECTION 05300

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 Lightgauge 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 05320 - Metal Floor Decking
- Section 05330 - Metal Form Deck
- Section 05500 - Miscellaneous Metals
- Section 07240 - Exterior Insulation and Finish System
- Section 09250 - Gypsum Drywall

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 lightgauge framing and accessories.
- B. Furnish the Architect/Engineer with certificates of all AWS Certified welders who will perform work on this project.

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:
- a. 18 gauge minimum (interior).
  - b. 16 gauge minimum (exterior).
  - c. Other gauges as and where otherwise indicated.
- 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.

### 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. Loose Steel Lintels.
  - 2. Miscellaneous Framing and Supports.
  - 3. Steel Concrete Inserts.
  - 4. Pipe Bollards.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 03300 - Cast-In-Place Concrete
- Section 04210 - Face Brick Masonry
- Section 05100 - Structural Steel
- Section 05210 - Steel Joists
- Section 05300 - 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 and painted.
  - 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 05582 - METAL COLUMN ENCLOSURES

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide metal column covers in sizes and profiles shown on drawings.
- B. Provide all trim, supports, clips and other accessories necessary for complete and finished installation.

1.02 SUBMITTALS

- A. Manufacturer's Literature
- B. Sample

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Column Covers.
  - 1. Alpolic Composite Aluminum or equal, 4 m.m. thick. (see drawings for location).
  - 2. Two piece full round column cover system with matching filler strip (rigid black vinyl).
  - 3. High luster fluorocarbon painted finish.
  - 4. Color: Selected from any available, including premium or additional cost colors.
  - 5. Mitsubishi Chemical Composites America, Inc. (1-800-422-7270)
  - 6. SAF column covers or equal (1-800-241-7429).
- B. Accessories.
  - 1. Blocking and concealed aluminum extrusions as necessary to connect enclosure to structural column.
  - 2. Sealant and backer rod at base.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install plumb and level, in accordance with manufacturer's instructions.
- B. Clean enclosures per manufacturer's instruction and protect from damage until Substantial Completion.

SUBMITTAL CHECKLIST

- 1. Manufacturer's Literature
- 2. Samples

END OF SECTION 05582

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 06400 - Architectural Woodwork  
Section 08211 - Flush Wood Doors  
Section 08710 - Finish Hardware  
Section 09250 - Gypsum Drywall - Steel Stud Construction  
Section 09900 - Painting

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 06400 - ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Architectural Woodwork as shown on the Drawings and specified herein, including:
1. Custom Cabinets and Casework:
    - a. Wood Cabinets - Plastic Laminate Faces.
    - b. Wood Bench - Shop Finished.
    - c. Plastic Laminate Countertops For Custom Cabinets and Casework.
    - d. Quartz Countertops For Custom Cabinets and Casework.
    - e. Solid Surface Window Sills.
  2. Miscellaneous Ornamental Items.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 06100 - Rough Carpentry.  
Section 06200 - Finish Carpentry.  
Section 08211 - Flush Wood Doors.  
Section 08710 - Finish Hardware.  
Section 09900 - Painting.  
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. Shop of manufacturer should be certified by the Architectural Woodwork Standards (AWS), and be capable of providing proof of such certification upon request.

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 of the quality grade indicated, or if not indicated, of Custom grade.
- 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 or finishes are not specified.
  2. Samples of specified items only, where colors or finishes have been indicated.
  3. Samples of each type, material, color, pattern and finish of all countertops and surfaces specified.
- B. Shop Drawings:
1. Field measurements shall be taken to verify that architectural woodwork, 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 architectural woodwork, cabinets and casework 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.
  4. Shop drawings on all architectural woodwork items, of sufficient detail and scale to determine compliance with design intent and specified quality grades.
  5. Manufacturer's descriptive literature of specialty items not manufactured by the architectural wood worker.

1.06 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.
- C. Deliver architectural woodwork, cabinets and casework as needed for immediate installation whenever possible. Any items delivered ahead of time for installation shall be stored by Contractor until project areas are ready for installation.

1.07 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.

1.08 WARRANTY

- A. Architectural woodwork, cabinets and 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.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Interior Wood for Transparent Finish:
  1. Select Red Oak, AWS Premium Grade.
  2. Plain Sliced.
- B. Interior Wood for Painted Finish:
  1. Poplar, AWS, Custom Grade.
- C. Veneer Wood for Transparent Finish:
  1. Select Red Oak, AWS Premium Grade.
  2. Plain Sliced.
  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.

- D. Hardwood Plywood:
  - 1. Product Standard PS 51.
- E. Softwood Plywood:
  - 1. Product Standard PS 1.
- F. Treated Paper Surfaced Plywood:
  - 1. Resin-Fiber overlaid plywood, un-grooved panel.
- G. Plastic Laminate:
  - 1. Acceptable Manufacturers:
    - a. "Formica"
    - b. "Wilsonart"
  - 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 HGS-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 unless otherwise noted.
- H. Solid Surfacing Material:
  - 1. Acceptable Manufacturers and Products:
    - a. "Dupont", "Corian".
    - b. "Living Stone Surfaces".
    - c. "LG Hausys", Acrylic Solid Surface.
  - 2. 1/2" thick for window sills, unless otherwise noted.
- I. Quartz Material:
  - 1. Acceptable Manufacturers and Products:
    - a. "Zodiaq" by "Dupont".
    - b. "Silestone" by "Cosentino".
    - c. "Cambria".
    - d. "Caesarstone International".
    - e. "Viatera" by "LG Hausys".
  - 2. 1-1/8" thick for countertops.
  - 3. 3/4" thick for backsplashes and end splashes.
  - 4. Edge Profile: Basic Eased.
- J. Particle Board:
  - 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.

K. Accessories:

1. Fillers, tops, end and side closures; finish to match adjacent cases, cabinets and countertops.
2. Finished back and end panels as required or indicated.
3. Back splashes on all countertops. End splashes only as specified.

L. Wood or Plastic Laminate Shelving:

1. Fully adjustable, typically.
2. Fixed where required for unit stability and/or positive door latching.
3. 1" actual thickness over 36" wide, 3/4" actual thickness less than 36" wide.

M. 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.

N. 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.

O. 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.

2.02 HARDWARE

- A. Pulls for drawers and doors shall be of clean, modern design offering a comfortable hand grip and shall attach to drawer or door with machine screws on 4" centers.  
Pulls shall be of extruded aluminum with satin lacquer finish.  
All pulls shall be centered on all drawer fronts.
- B. Latching assembly for tall case double swinging doors shall consist of an eccentric plate operating two 1/8" x 5/8" plated vertically operating locking bars. 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. The lock attached to the right hand door shall operate a bolt which, when locked, shall overlap the left hand door providing secure locking. Single doors shall be locked to case sides.
- C. Hinges shall be five knuckle institutional type heavy-duty hinges, concealed.  
Hinges shall be 2-1/2" chrome, satin finish.  
Hinges are to be mounted to door and case with not less than three screws per wing.
- D. Catches shall be provided on swinging doors and shall be a spring-loaded nylon roller type.
- E. Provide cork, plastic, or rubber type silencers on all drawers and doors.

- 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. All spaces shall have all doors and drawers keyed alike within entire room.
    - b. Provide grandmaster key to operate all locks of all master keys for all spaces.
- G. Provide epoxy coated steel drawer slides with nylon rollers and self-closing feature at all standard and file drawers. Drawer slide load capacity to be 100 lb. static load rating, minimum and 150 lb. static load rating, minimum at all file drawers. Provide with full extension of drawer body beyond the face of the cabinet; 3/4 extension slides are not acceptable.
- H. Drawer stops shall be provided on all drawers to prevent inadvertent removal. Stops shall be automatic type, zinc plated steel.
- I. Shelf supports shall be die-formed to insert into pre-drilled holes on interior of cases and cabinets. Supports shall provide shelf adjustment on 32 mm centers. Shelf supports shall be plated steel. Shelves longer than 48” shall have additional support at center and at 24” maximum spacing otherwise.
- J. Chain stops or door restraints shall be provided at the top of all doors to all tall cabinets. Provide chain stops or door restraints at the top of all doors to all base and wall cabinets that open directly into a wall surface or obstruction. Finish of stops to match hinges.

## 2.03 FABRICATION

- A. Custom Cabinets and Casework:
  - 1. Fabricate in compliance with AWS Premium Grade for all cases and cabinets.
  - 2. Fabricate in compliance with AWS Premium Grade for plastic laminated tops.
  - 3. Conform to Full Flush Overlay design details for all doors and drawers.
  - 4. Fabricate in shop in largest units possible.
  - 5. Machine for all hardware in shop.
- B. Miscellaneous Ornamental Work:
  - 1. “Flex Trim” by Carter Millwork, Flexible polyurethane composite trim as shown on Drawings.
- C. Factory Finishing:
  - 1. To greatest possible, finish architectural woodwork at shop or factory.
  - 2. Comply with AWS Section 1500 requirements for finishes specified.
- D. Joinery:
  - 1. Handwrap fluted dowel construction.
  - 2. 8mm minimum.
  - 3. Doweled and glued.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Field measure all areas to receive architectural woodwork prior to fabrication. Provide any necessary closures and trim to fit the items to enclosing walls. Provide other trades with information necessary for proper completion of related work.
- B. Not all details of millwork are shown on the Drawings. Utilize the most advantageous manufacturing processed to achieve the quality and design intent indicated.
- C. Install architectural woodwork only after flooring and wet work have been finished and proper heat and ventilation have been provided to maintain a uniform heat with not more than 50 percent relative humidity. Allow 7 days of storage of architectural woodwork in area in which it is to be installed to permit wood to reach optimum moisture content.
- D. All laminated doors and drawers to be laminated all sides with GP-50, 0.50" thick.

3.02 INSTALLATION

- A. Exercise care to avoid damage to finished surfaces during handling and erection. Repair all damaged surfaces and blemishes arising from such operation. Replace items which cannot be satisfactorily repaired.
- B. Install paneling in correct position with concealed mechanical fastenings. Provide a minimum of nine (9) mechanical fasteners per wall panel unit, installed in such a way as to draw the panel uniformly tight to the supporting framework.
- C. Install all scribe strips accurately fitted to adjacent surfaces and securely anchored in position.
- D. Field modify architectural woodwork to accommodate conduits, piping, etc., in a neat and workmanlike manner.
- E. Attach all casework to floors and walls and anchor by concealed bolts or wood screws into inserts on floors and grounds, blocking, and nailers on walls. Provide all grounds, blocking, and nailers as necessary for all items. Trim and finish cabinets with scribe members for a neat and finished installation. Furnish hardware as specified. Equip each cabinet door with cabinet hinges, silencers, magnetic catch and pull. Mount each drawer on drawer slides and provide with a pull and silencers. Install adjustable standards and supports for adjustable shelves.
- F. Install casework so that doors will fit openings properly and be accurately aligned. Adjust hardware to center doors and provide unencumbered operation.

3.03 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork properly to eliminate defects functionally and visually; where not possible to repair properly, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean hardware, lubricate and make final adjustments for proper operation.
- C. Clean all woodwork and cabinets on exposed and semi-exposed surfaces, inside and out. Touch-up shop-applied finishes to restore damaged or soiled areas. Clean all plastic laminate with mild abrasive cleaner and polish with "Cabinet Magic" or similar laminate polish product.

- D. Complete the finishing work specified as work of this section, to whatever extent not completed at shop or prior to installation of woodwork.

3.04 PROTECTION

- A. Protect architectural woodwork so that it is without damage or deterioration at time of substantial completion.

SUBMITTAL CHECK LIST

1. Samples.
2. Shop Drawings.
3. Manufacturer's Literature.

END OF SECTION 06400



SECTION 06650 - PLASTIC FABRICATIONS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Plastic fabrications used as a feature wall where indicated on the Drawings.

1.02 SUBMITTALS

A. Product Data:

1. Provide manufacturer's published product data and fabrication information.
2. Indicate all hardware components and accessories.
3. Material Safety Data Sheets (MSDS).

B. Shop Drawings:

1. Include plans, elevations, sections, details and attachments to other work.
2. Indicate product, décor, dimensions, thickness and texture.
3. Show locations of items which are to be coordinated with plastic fabrications.
4. Indicate anchorage and support details.

C. Samples:

1. If indicated, provide 4"x4" samples of colors as selected.  
Samples must represent each type, texture, pattern, and color of plastic fabrication.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in labeled packages and in manufacturer's original sealed containers, undamaged and with seals and labels intact.
- B. Store and handle in strict compliance with manufacturer's instructions, recommendations and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures and construction operations.
- C. Prior to installation, allow items to reach room temperature.

1.04 PROJECT CONDITIONS

- A. Building areas to receive plastic fabrications shall be free of construction dust and debris.
- B. Do not install plastic fabrications until spaces are enclosed and weatherproof, and ambient temperatures and humidity conditions are maintained at the levels indicated for project when occupied for its intended use.

1.05 WARRANTY

- A. Written warranty executed by the manufacturer agreeing to repair or replace plastic fabrications that fail within the warranty period of two (2) years from the Date of Substantial Completion.
- B. Failures to include, but not be limited to: manufacturer defects, rusting of attachments or other components, fading of surfaces, colors or textures.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturer's offering products which may be incorporated in the Work include the following:
1. "3form".

2.02 PLASTIC FABRICATIONS

- A. Material: Engineered polyester resin.
1. Sheet size: 4 feet x 10 feet.
  2. Thickness: 3/8".
  3. Product Series: Varia ecoresin.
  4. Edges: Polished, unless otherwise indicated on Drawings
  5. Surface Texture: As indicated on the Drawings.
  6. Pattern orientation: As indicated on the Drawings.
  7. Colors: As indicated on the Drawings.
  8. Material shall be cut to size, edges sealed, and mounted in desired location per Drawings.
  9. Fire Properties: ASTM-E-84/UL 723: Passes.
- B. General: Fabricate Plastic Fabrications to designs, sizes and thicknesses indicated and to comply with indicated standards. Sizes, profiles and other characteristics are indicated on the drawings.
- C. Comply with manufacturer's written recommendations for fabrication.
- D. Machining: Acceptable means of machining are listed below. Ensure that material is not chipped or warped by machining operations.
1. Sawing: Select equipment and blades suitable for type of cut required.
  2. Drilling: Drills specifically designed for use with plastic products.
  3. Milling: Climb cut where possible.
  4. Routing
  5. Tapping.
- E. Forming: Form products to shapes indicated using the appropriate method listed below. Comply with manufacturer's written instructions.
1. Cold Bending
  2. Hot Bending
  3. Thermoforming
  4. Drape Forming
  5. Matched Mold Forming
  6. Mechanical Forming
- F. Laminating: Laminate to substrates indicated using adhesives and techniques recommended by manufacturer.
- G. Attachment Systems:
1. Installation hardware shall include all components as required for the complete installation.
  2. Provide mounting hardware as shown on Drawings.
  3. Hardware should include all base plates, cover plates, caps and brackets.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Measure each area of installation and establish layout.
- B. Comply with Drawings as to layout locations, heights, orientation, etc.
- C. Coordinate with all other trades for layout and location.

3.02 INSTALLATION

- A. Install in strict compliance with manufacturer's published recommendations and instructions.
- B. Anchor components firmly into position.

3.03 CLEANING AND ADJUSTING

- A. Replace any damaged or broken items or components.
- B. Adjust for final location as approved by the Architect.
- C. Clean all surfaces per manufacturer's instructions.

SUBMITTAL CHECKLIST

- 1. Product Data.
- 2. Shop Drawings.
- 3. Samples.

END OF SECTION 06650

SECTION 07130 - SELF-ADHERING SHEET WATERPROOFING MEMBRANE

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Self-adhering SBS modified bitumen asphalt waterproofing membrane rated for exterior, below grade applications.
2. Application on masonry or concrete surfaces where indicated on drawings.
3. Related Documents: 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. Areas of Installation:

1. In general, this system is to be installed on all walls where one surface (interior or exterior) of the wall is below-ground while the opposing surface is above finish floor elevation.
2. Drawings indicate general intent of areas of installation, but cannot indicate or detail every specific location required.
3. Provide this system at all elevator pits and shaft locations, whether indicated or not.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM D 412 (C):  
Specification for percent of elongation to ultimate failure of prefabricated, reinforced, polymer-modified bituminous sheet membranes used for waterproofing applications.
2. ASTM D 5147:  
Specification for percent of elongation to ultimate failure of rubberized asphalt membrane.

1.03 SUBMITTALS

A. Product Data:

1. Provide manufacturer's published product data and cutsheets.
2. Provide properties of primer, bitumen, and mastics.
3. Material Safety Data Sheets (MSDS).

B. Samples:

1. Submit representative samples of the membrane for approval.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in labeled packages and in manufacturer's original sealed containers, undamaged and with seals and labels intact.
- B. Store and handle in strict compliance with manufacturer's instructions, recommendations and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures and construction operations.
  1. Provide covers and tarps on top and all sides, allowing for adequate ventilation.
  2. Protect boards, primer, mastic and adhesive from moisture and potential sources of ignition.
- C. Remove damaged material from the site and dispose of in accordance with applicable regulations.
- D. Sequence deliveries to avoid delays, but minimize on-site storage.

1.05 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials and products used.
- B. Proceed with installation only when substrate construction and preparation work is complete and in condition to receive the self-adhering sheet waterproofing membrane system.

PART 2 - PRODUCTS

2.01 SELF-ADHERING SHEET WATERPROOFING MEMBRANE

- A. Provide one of the following approved products:
  - 1. "Tremco"; Tamko TW-60.
  - 2. "Soprema"; Colphene ICF.
  - 3. "WR Meadows/Sealtight"; Mel-Rol.
  - 4. "Carlisle"; Miradri 860/861.
- B. Self-Adhering Membrane:
  - 1. SBS modified bitumen asphalt sheet membrane.
  - 2. Self-adhesive surface on the back side with a removable film.
  - 3. Face side to have a protective facer sheet film of polyester or polyethylene to provide the sheet membrane 100 percent protection against damage from UV radiation.
  - 4. Rated for exterior use below-grade.
  - 5. Need not be designed for permanent exterior exposure to the elements.
  - 6. 40 mils minimum thickness.
- C. Miscellaneous Materials:
  - 1. Provide all primers, mastics, fasteners, sealers, sealants, tape and accessories as required for a fully complete system.
  - 2. All miscellaneous materials shall be as specified herein; all others to be as determined acceptable and applicable by the waterproofing system manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. The installer shall examine conditions of substrates and other conditions under which this work is to be performed and notify the contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until satisfactory conditions are corrected.
- B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of membrane.
- C. Verify items which penetrate surfaces to receive membrane are securely installed.
- D. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- E. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.02 PREPARATION OF SUBSTRATES

- A. Refer to manufacturer's literature for requirements for preparation of substrates.

- B. Surfaces shall be structurally sound and free of voids, spalled areas, loose aggregate and sharp protrusions.
- C. Remove contaminates such as grease, oil and wax from exposed surfaces.  
Remove dust, dirt, loose stone and debris.
- D. Use repair materials and methods which are acceptable to the manufacturer of the waterproofing system.  
Apply mastic to seal penetrations, small cracks or minor honeycomb in substrate.
- E. Clean and prepare surfaces to receive membrane in strict accordance with manufacturer's published instructions.

3.03 INSTALLATION

- A. Prime surfaces in accordance with manufacturer's published instructions.
- B. Install self-adhering sheet membrane to substrate surface, providing for full coverage of all areas and surfaces in strict accordance with manufacturer's published installation instructions.
- C. Seal all edges, seams, penetrations, joints and laps complete.
- D. Inspect waterproofing application and test for complete waterproofing ability as intended.

3.04 CLEANING AND PROTECTION

- A. Remove any masking materials after installation.  
Clean any stains or marks on materials exposed to view in the completed work.
- B. Backfill and cover installation per manufacturer's instructions and within recommended timeframe.
- C. Protect completed waterproofing from exposure to elements and from subsequent construction activities as recommended by the manufacturer.

SUBMITTAL CHECKLIST

- 1. Product Data.
- 2. Samples.

END OF SECTION 07130

SECTION 07190 - WATER REPELLENTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work covered by this Section includes water repellent protective coating applied to concrete and masonry surfaces, as indicated on the Drawings and specified herein.

1.02 SUBMITTALS

- A. Product Data:
1. Manufacturer's product data sheets, cutsheets, specifications and materials description.
  2. Manufacturer's test data, stating coating performance expectations and limitations.
  3. Manufacturer's Material Data Safety Sheets (MSDS).
  4. Manufacturer's installation instructions, stating specific conditions requiring special attention and cautionary procedures required during application.
  5. VOC content.
- B. Certifications:
1. Manufacturer's certification that products meet or exceed the specified requirements.
  2. Manufacturer's documentation of experience indicating compliance with specified qualification requirements.
  3. Applicator's documentation of experience indicating compliance with specified qualification requirements.
- C. Warranty:
1. Manufacturer's written warranty as specified.
  2. Applicator's written warranty as specified.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original, unopened, containers.
- B. Transport, handle, store and protect products in strict accordance with the manufacturer's requirements and recommendations.
- C. Protect coating liquid from freezing. Discard and replace any product exposed to freezing conditions.

1.04 QUALITY ASSURANCE

- A. Manufacturer and Supplier's Qualifications:
1. Manufacturer shall be a professional company specializing in manufacturing the specified products, with a minimum of five (5) years of documented experience.
  2. Applicator shall be a professional company specializing in performing the work of this Section, with a minimum of five (5) years of documented experience.
  3. Manufacturers and Suppliers wishing to be have products included for bidding shall submit qualifications in writing to the Architect no later than ten (10) days prior to the bid.
- B. Regulatory Requirements:
1. Comply with applicable rules and regulations of Pollution Control regulatory Agency having jurisdiction regarding volatile organic compounds (VOC) and use of hydrocarbon solvents.

1.05 WARRANTY

- A. Manufacturer's written warranty agreeing to supply any/all materials as required for repair or reapplication of materials that fail to provide water repellency, as determined by the Architect.

- B. Applicator's written warranty agreeing to perform any/all work as required for repair or reapplication of materials that fail to provide water repellency, as determined by the Architect.
- C. Warranty period for both the manufacturer and applicator shall be three (3) 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 manufacturers:
  - 1. "ProSoCo, Inc."
  - 2. "Tnemec, Inc. / Chemprobe"prosoco
  - 3. "Foxfire International"
  - 4. "Tremco Barrier Solutions"

### 2.02 MATERIALS

- A. Provide one of the following approved systems:
  - 1. Brick, Concrete Block:
    - a. "ProSoCo, Inc.", Sure Klean, Weather Seal, Siloxane WB.
    - b. "ProSoCo, Inc.", Sure Klean, Weather Seal, Siloxane PD.
    - c. "Tnemec, Inc.", Chemprobe, Series V662, Prime-a-Pell Plus.
    - d. "Foxfire International", Foxfire 5000WB.
    - e. "Tremco", Chemstop WB Heavy Duty.
- B. Description:
  - 1. Siloxane/Silane, water-based, penetrating water repellent.
  - 2. Formulated for use on above-grade concrete and masonry, vertical and horizontal surfaces.
  - 3. Formulated to help concrete and masonry surfaces to resist cracking, spalling, staining and other damage related to water intrusion.
  - 4. Resistant to ultraviolet and weather deterioration.
  - 5. Ready-to-use without requirement for on-site mixing or dilution.
  - 6. Alkaline stable, low odor.
  - 7. Clear, filmless and invisible when dry. Shall not alter the color or texture of the substrate surface.
  - 8. Non-staining, non-yellowing, and breathable.
  - 9. Reduce efflorescence and spalling.
- C. Performance Data:
  - 1. VOC content to be 400 grams/liter (3.34 lbs/gallon), maximum.

## PART 3 - EXECUTION

### 3.01 INSPECTION AND PREPARATION

- A. Contractor shall be responsible for inspection of site, approval of substrate surfaces, installation conditions and field measurements for this work.
- B. Verify that all conditions are as required and ready to receive work.
- C. Verify that all joint sealants are installed and cured.



- D. Verify that all surfaces to be coated are dry, clean, and free from efflorescence, oil, or other matter detrimental to application of coating.
- E. Report in writing any prevailing conditions that will adversely affect the satisfactory execution of the work. Do not proceed with work until any/all unsatisfactory conditions have been corrected.
- F. Commencement of work constitutes acceptance of all conditions by the Contractor and assumes the responsibility for correction of unsuitable conditions encountered at no additional costs to the Owner.

3.02 ENVIRONMENTAL CONDITIONS

- A. Do not apply products during the following conditions:
  - 1. Ambient temperature below 40 degrees F.
  - 2. Rain or temperatures below 40 degrees F are predicted for a period of 24 hours after application.
  - 3. Substrate surfaces frozen or surface temperatures are below 40 degrees F.
  - 4. Substrate surfaces have cured less than 30 days.
  - 5. Substrate surfaces not dry for a minimum of 24 hours prior to application.

3.03 PREPARATION

- A. Remove loose particles and foreign matter. Remove oil or foreign substance with a cleaning agent that will not affect coating.
- B. Scrub and rinse all surfaces with water and allow to thoroughly dry.
- C. Protect adjacent surfaces not scheduled to receive coating. If applied on unscheduled surfaces, remove immediately by methods approved by the manufacturer.
- D. Protect landscaping, property and vehicles from overspray and drift.

3.04 APPLICATION

- A. Delay work until masonry mortar is cured for seven (7) days, minimum.
- B. Apply coating in strict accordance with manufacturer's published instructions, using appropriate methods and coverage rates per coat.
- C. Apply two (2) coats, minimum.

SUBMITTAL CHECK LIST

- 1. Product Data.
- 2. Certifications.
- 3. Warranty.

END OF SECTION 07190

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. Foundation Wall Insulation.
  - 2. Batt/Blanket Sound Insulation.

1.02 RELATED SECTIONS

- Section 03300 - Cast-In-Place Concrete
- Section 04210 - Face Brick Masonry
- Section 04220 - Concrete Unit Masonry
- Section 09250 - Gypsum Drywall - Steel Stud Construction

1.03 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.
  
- B. Fire and Insurance Ratings:  
Comply with fire-resistance, flammability and insurance ratings indicated, and comply with governing regulations as interpreted by authorities.

1.04 SUBMITTALS

- A. Product Data:
  - 1. Manufacturer's specifications and installation instructions for each type of insulation required.
  - 2. Material Safety and Data Sheets (MSDS).

1.05 DELIVERY, STORAGE AND HANDLING

- A. Do not allow insulation materials to become wet, soiled, or covered with ice or snow. Comply with manufacturer 's recommendations for handling, storage and protection during installation.
  
- B. Protection for Plastic Insulation:
  - 1. Do not expose to sunlight.
  - 2. Protect against ignition at all times. Do not deliver plastic insulation materials to project site ahead of installation time. Complete installation and concealment of plastic materials as rapidly as possible in each work area.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Foundation Wall Insulation:
  - 1. Provide one of the following approved products:
    - a. "Dow Chemical Company", Styrofoam.
    - b. "Owens-Corning", Foamular.
  - 2. Rigid, closed-cell, extruded polystyrene insulation board with integral high-density skin:
    - a. 25 psi minimum compressive strength.
    - b. K-value of 0.20.

- c. 0.5% maximum water absorption.
- d. Minimum value "R-5" per inch thickness, or as otherwise indicated on drawings.
- e. Meeting all requirements of ASTM C578 Type IV.
- 3. Size:
  - a. Manufacturer's standard lengths and widths.
  - b. Thicknesses and R-Value as indicated on Drawings, or if not indicated, 2" thick, R-10.0 min.
- B. Batt/Blanket Sound Insulation (formaldehyde, acrylic and dye free):
  - 1. Mineral Wool Batts.
    - a. Provide one of the following approved products:
      - 1). "Owens Corning" Sound Attenuation Fire Batts (Mineral Wool).
      - 2). "Thermafiber" Safing Insulation.
    - b. Unfaced.
    - c. 48" lengths in width of 16" or 24", as required to accommodate building component spacing.
    - d. 3" thick minimum to provide NRC value of 1.05 minimum.
    - e. Friction fit between studs at rated partition walls, or as indicated on drawings.
- C. Miscellaneous Materials:
  - 1. Adhesive for bonding insulating 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.
- B. Perimeter Insulation:
  - 1. On vertical surfaces, set units in adhesive applied in accordance with manufacturer 's instructions. Use type adhesive recommended by manufacturer of insulation.
  - 2. At interior side of foundation walls, extend insulation continuous from top of footing to bottom of slab.
  - 3. At exterior side of foundation walls, extend insulation from top of footing to grade line and cut top of insulation board along grade line as required.

### SUBMITTAL CHECK LIST

- 1. Product Data.

END OF SECTION 07200

**NOTE TO SPECIFIER:**

**This section specifies rigid insulation as part of a "Class A" rated E.P.D.M. roof.  
See roofing specification under Division 7 to see if insulation is already specified as part of that Section.**

SECTION 07223 - ISOCYANURATE ROOF INSULATION

PART 1 - GENERAL

1.01 WORK INCLUDED

Furnish labor, materials, equipment, special tools, supervision and services required to complete all roof insulation work indicated, noted, detailed and scheduled on the drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 05300 - Metal Roof Deck

Section 06100 - Rough Carpentry

Section 07531 - Elastomeric Sheet Roofing System - Fully Adhered (EPDM)

Section 07532 - Elastomeric Sheet Roofing System - Ballasted (EPDM)

Section 07533 - Elastomeric Sheet Roofing System - Mechanically Fastened (EPDM)

Section 07600 - Flashing, Sheet Metal and Roof Accessories

1.03 SUBMITTALS

A. Submit for approval by the Architect, manufacturer's literature.

B. Furnish complete layout shop drawings for tapered insulation.

C. Furnish certificate that insulation and roofing meet UL Class A assembly rating and Factory Mutual Class 1, I-90 classifications.

1.04 DELIVERY, STORAGE AND HANDLING

A. Store under water resistant cover protected from weather and direct sunlight, and store above ground or roof deck on wood pallets.

B. Handle boards carefully to prevent broken corners or split boards.

C. Do not store boards on roof in such a manner as to overload capacity of structural components.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Roof insulation shall consist of 2 layers of isocyanurate FS HH-I-1972/2 (1), Class 1.

1. Boards shall be furnished in standard sizes 3 feet x 4 feet inches or 4 feet x 4 feet inches, contractors option.

2. Total thickness as indicated on Drawings.

B. Tapered insulation shall be perlite (ASTM C 728-89a) 1/2 inch minimum thickness.

Tapered insulation will be installed between 2 layers of roof insulation specified above.

1. Slope 1/8 inch per foot minimum, or as otherwise indicated.

2. Furnish fill boards as required to build up slope.

C. Edge reducing strips shall be fabricated of material acceptable to the EPDM membrane supplier.

- D. Mechanical fasteners shall be type, size, spacing and pattern as recommended by manufacture to meet Factory Mutual Class 1, 1-90 classification, and as approved by roof manufacturer for roof warranty requirements.

### PART 3 - EXECUTION

#### 3.01 PREPARATION

- A. Deck shall be rigid, tight, dry, smooth, clean and free from defects and damage.
- B. Insulation stops of Treated Wood Blocks 6 inches wide by thickness of insulation shall be installed as detailed on drawings, at all edges of roof areas to receive insulation and all vertical penetrations of roof.

#### 3.02 APPLICATION

- A. Insulation on metal deck shall be installed with long edge parallel to the flutes. Insulation shall be set using mechanical fasteners.
- B. Insulation boards shall be loosely laid on the roof not exceeding 1/4 inch apart. All gaps greater than 1/4 inch must be filled with insulation of the same.
- C. Insulation shall be neatly fitted to all roof penetrations, projections, and nailers with no gaps greater than 1/4 inch. Tapered or feathered insulation shall be installed around roof drains in a way to provide proper slope for drainage.
- D. No more insulation shall be installed than can be covered with roofing membrane and completed before the end of the day's work or before the onset of inclement weather.
- E. Where tapered insulation is required, install between 2 layers of isocyanurate to maintain clean working surface for application of roof membrane.

#### 3.03 CLEAN-UP

- A. At completion of roofing insulation work remove all trash and debris from roof and site.

### SUBMITTAL CHECK LIST

1. Manufacturer's Literature.
2. Shop Drawings.
3. UL and FM Certificates.

END OF SECTION 07223

SECTION 07240 - EXTERIOR INSULATION AND FINISH SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Base Bid:

Furnish labor, materials, equipment, special tools, supervision and services required to install a complete exterior insulation and finish system (E.I.F.S.), as indicated, noted, detailed and scheduled on the Drawings and specified herein.

B. Alternate No. 2:

Requires the reinspection, repair and refinishing of all existing "exterior insulation and finish systems, except for portions removed by the contract documents. The Contractor shall comply with these specifications as a basis of repair and refinishing of the existing exterior insulation and finish system.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 07900 - Joint Sealers

Section 08410 - Aluminum Entrances and Storefronts

Division 15 - Mechanical Vents, Grilles and Louvers

Division 16 - Lighting Fixtures

1.03 QUALITY ASSURANCE

A. Exterior Insulation and Finish System shall be installed only by factory-trained and manufacturer approved and licensed contractors familiar with the product and in strict accordance with the manufacturer's instructions.

B. All details relating to the installation by the approved contractor and/or by the manufacturer will furnish a 5 year Warranty for the installation.

C. All materials used shall be as furnished or approved by the E.I.F.S. manufacturer for use and compatibility with the entire E.I.F.S. system.

D. Manufacturer shall send a qualified technical representative to the project site for purpose of advising Installer of procedures and precautions related to use of E.I.F.S. materials.

E. UL Listing: Flamespread less than 25.

1.04 SUBMITTALS

A. Product Data:

1. Manufacturer's published specifications, installation instructions and general recommendations. 2. Include data substantiating that materials comply with specification requirements.

B. Shop Drawings:

1. Complete drawings, showing configuration, joint layout, connections, expansion joints and details.

C. Samples:

1. Samples of manufacturer's selection of colors for selection by Architect.

2. Samples of manufacturer's entire selection of surface textures for selection by Architect.

3. Submit 24 inch square sample of finished E.I.F.S. system, including gypsum board, insulation and all finish materials.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver packaged materials to site in manufacturer's original unopened, labeled, bundles or containers.
- B. Arrange deliveries to provide sufficient quantities to permit continuity of any phase of work.
- C. Do not store material on floor or roof construction in concentrations large enough to impose excessive stress on decking or structural members.
- D. Materials shall be stacked and protected from moisture penetration and freezing.

1.06 JOB CONDITIONS

Proceed with E.I.F.S. installation when existing and forecasted weather conditions permit work to be performed in accordance with manufacturer=s recommendations and warranty requirements.

1.07 SPECIAL PROJECT WARRANTY

Provide written warranty, signed by manufacturer of primary E.I.F.S. for materials and workmanship for a period of 5 years after date of Final Acceptance.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURER'S

- A. Primary E.I.F.S. System Materials:
  - 1. "Dryvit Systems, Inc."
  - 2. "STO Corporation"
  - 3. "BASF/Senergy"

2.02 MATERIALS

- A. All components shall be obtained from or approved by the primary E. I. F.S. manufacturer.
- B. Gypsum Board Sheathing Substrate (Fire Rated Assemblies):
  - 1. Provide one of the following approved products:
    - a. "Georgia-Pacific", "Dens-Glass Fireguard".
  - 2. Manufacture to meet specifications for ASTM D 3273.
  - 3. Provide in maximum lengths available to minimize end-to-end butt joints.
  - 4. Fiber glass mats over moisture-resistant gypsum core. Paperless facings.
  - 5. Thickness:
    - a. Framing at 16 inches o.c.: 1/2 inch, or as otherwise indicated on the Drawings.
    - b. Framing at 24 inches o.c.: 5/8 inch, or as otherwise indicated on the Drawings.
  - 6. Width: 4 feet.
  - 7. Length: 8 feet minimum.
  - 8. Edges: Square.
- C. Sheathing Fasteners:
  - 1. Corrosion-resistant, self-drilling, self-tapping type.
  - 2. Spacing:
    - a. 8 inches o.c. along edge of sheathing at joint.
    - b. 12 inches o.c. in field area of sheathing.

- D. Insulation Board:
  - 1. Molded polystyrene boards as approved by E.I.F.S. manufacturer.
  - 2. Density: 1.0 pcf.
  - 3. Size: 2 feet x 4 feet maximum; 1 inch thick minimum.
  - 4. Flamespread: 25 maximum when tested per ASTM E-84.
  - 5. Smoke Development: 450 maximum when tested per ASTM E-84.
  - 6. Thermal Value: "k" per inch.
    - a. .23 BTU/°F/SF at 40°F
    - b. .23 BTU/°F/SF at 74°F
- E. Insulation Board Adhesive:
  - 1. Acrylic polymer-modified base coat material mixed with Portland cement.
  - 2. Ready-mixed or field-mixed.
- F. Impact-Resistant Reinforcing Mesh:
  - 1. Treated, open weave, glass fiber type.
  - 2. Acceptable products:
    - a. "Dryvit", "Panzer 20".
    - b. "STO", "Armour Mat XX".
  - 3. 20 ounce.
  - 4. Provide and install a layer of impact-resistant reinforcement mesh below a layer of manufacturer's standard reinforcing mesh.
- G. Finish:
  - 1. Factory-mixed, 100% pure acrylic base.
  - 2. Integral color and texture.
  - 3. Color and texture to match existing.
- H. Water:
  - 1. Clean, potable and free and all foreign matter.
- I. Sealant:
  - 1. Refer to Section 07900-Joint Sealers.

2.03 MIXING AND PREPARATION

- A. Adhesive:
  - 1. No mixing required. Water should not be added.
- B. Finish:
  - 1. Thoroughly stirred until a uniform workable consistency is obtained.
  - 2. Small amount of water may be added to adjust workability.
  - 3. No additive, or materials of any kind, such as rapid binders, antifreeze, accelerators, filters, pigments, etc. shall be added under any circumstances.
  - 4. Use finish material immediately after mixing. Container to be kept closed when not in use.
- C. Reinforcing Mesh:
  - 1. Reverse roll to remove curling tendencies.



PART 3 - EXECUTION

3.01 INSPECTION

- A. Examination of Substrate:
  - 1. Prior to installation of the E.I.F.S., the Substrate shall be examined by the Applicator as follows:
    - a. The Substrate shall be a type approved by E.I.F.S.
    - b. The Substrate surface shall be free of foreign materials such as oil, dust, dirt, form-release agents, paint, wax, glazing, water, moisture, frost, etc.
    - c. The Substrate shall be examined for compliance with Contract Documents.
    - d. The Substrate shall be examined for soundness, such as tightness of connections, crumbling or looseness of surface, voids and projections, etc.
    - e. The Substrate shall be examined for dimensional correctness.
  - 2. The Architect and Contractor shall be advised of all discrepancies. Work shall not proceed until unsatisfactory conditions are corrected.

3.02 INSULATION BOARD INSTALLATION

- A. Apply insulation boards to substrate beginning from the bottom with joints offset to produce a running bond pattern.
- B. Precut board to fit openings, corners, projections, etc.
- C. Apply adhesive directly to one surface of the insulation board using a notched trowel over entire board surface.
- D. Apply a 2 inch wide x 3/8 inch thick ribbon of adhesive around entire perimeter of board.
- E. Install board immediately after application of adhesive. Slide into final position, tight against adjacent boards.
- F. Tamp entire area of board to ensure complete contact of adhesive.
- G. Allow 24 hours minimum for adhesive to form a positive bond.

3.03 DESIGNS AND SHAPES

- A. Grooves and other features are to be routed into the outside surface of the insulation board. The minimum thickness of the board at any point in the routed groove or feature must not be less than 3/4 inch.
- B. Apply foam shapes of insulation board directly to the substrate or surface of the insulation board.
- C. Follow the E.I.F.S. manufacturer's detailed instructions for these procedures.
- D. **All soffits to have routed "drip" reveals, continuous at perimeter.**

3.04 BASE COAT

- A. Inspect the surface of insulation board for flatness. High areas out-of-plane are to be sanded flat.
- B. Repair any damaged board surfaces and remove foreign materials.
- C. Apply a 1/16 inch uniform layer of adhesive mixture to the surface of insulation board.

- D. Embed impact-resistant reinforcing mesh into adhesive.
- E. Smooth out the adhesive mixture with a trowel until mesh is fully embedded. Mesh pattern should not be visible.
- F. Allow 24 hours minimum for base coat to form a positive bond.
- G. Protect the base coat from damage and weather while curing.

3.05 FINISH COAT

- A. Apply the finish continuously and in one operation to the entire wall surface. Maintain a wet edge at all times.
- B. The installer is responsible for providing sufficient manpower, scaffolding and equipment to ensure a continuous operation and uniform appearance.
- C. Work shall proceed toward joints and corners.
- D. Apply the finish in a tight coat to the base coat. Leveling and texturing are to be one operation.
- E. The maximum thickness of finish coat should not be greater than of the largest aggregate.

3.06 FIELD QUALITY CONTROL

- A. An authorized representative of the E.I.F.S. must visit the project site during construction to inspect the means, methods and materials being used for the entire E.I.F.S.

3.07 CLEAN-UP

- A. All excess materials, scraps, debris, etc. are to be removed from the project site upon completion.
- B. Clean all adjacent surfaces and materials and the work area in general of foreign materials resulting from their work.

SUBMITTAL CHECK LIST

- 1. Product Data.
- 2. Shop Drawings.
- 3. Samples.

END OF SECTION 07240

SECTION 07264 – SPRAY FOAM INSULATION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Extent of foam insulation work is indicated on the Drawings and specified herein.
- B. Foam fill all exterior metal stud systems where indicated on plans. Apply foam only after electrical conduits, etc. have been installed in metal stud system.

1.02 RELATED SECTIONS

- Section 04220 – Concrete Unit Masonry
- Section 06100 – Rough Carpentry
- Section 09250 – Gypsum Drywall – Steel Stud System (Non-load bearing)

1.03 SUBMITTALS

- A. Product Data:
  - 1. Submit manufacturer's literature and product data sheets.
  - 2. Submit manufacturer's installation instructions.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Do not allow insulation materials to become wet, soiled, or covered with ice or snow. Comply with manufacturer ' s recommendations for handling, storage and protection during installation.
- B. Protection for Plastic Insulation:
  - 1. Do not expose to sunlight.
  - 2. Protect against ignition at all times. Do not deliver plastic insulation materials to project site ahead of installation time. Complete installation and concealment of plastic materials as rapidly as possible in each work area.
- C. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, date of manufacture, expiration date, and directions for storage. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air/vapor barrier manufacturer. Protect stored materials from direct sunlight.
- D. Avoid spillage. Immediately notify Owner if spillage occurs and start clean up procedures.
- E. Clean spills and leave area as it was prior to spill.

1.05 WASTE MANAGEMENT AND DISPOSAL

- A. Place materials defined as hazardous or toxic waste in designated containers. Ensure emptied containers are sealed and stored safely for disposal away from children.

1.06 PROJECT CONDITIONS

- A. Environmental Conditions: Apply within range of ambient and substrate temperatures recommended by manufacturer. Do not apply to a damp or wet substrate, unless the manufacturer specifically permits that for the product.
- B. Do not apply in snow, rain, fog, or mist.

- C. Do not apply when the temperature of substrate surfaces and surrounding air temperatures are below those recommended by the manufacturer.
- D. The product shall not be installed after the expiry date printed on the label of each container.

## PART 2 – PRODUCTS

### 2.01 FOAM INSULATION

- A. Provide one of the following products:
  - 1. “Bayer”, Bayseal Wall Foam Insulation.
  - 2. “NCFI”, Insulstar Comercial.
  - 3. “Henry”, Permax. 1.8 HY Closed Cell System
  - 4. “Dow”, CM 2045 Series.
  - 5. “Tailored Chemical Products”.

### 2.02 PERFORMANCE REQUIREMENTS

- A. Material shall meet or exceed the following performance requirements:
  - 1. R value: 6.5 per inch minimum (ASTM C-177).
  - 2. Smoke developed: 450 max.
  - 3. Flame spread: 25 max. (ASTM E84).
  - 4. Noncombustible, Class A building material.
  - 5. Provide “Closed Cell Foam” with integral vapor barrier.
- B. Fire and Insurance Ratings:  
Comply with fire-resistance, flammability and insurance ratings indicated, and comply with governing regulations as interpreted by authorities.

## 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.
- B. Examine substrates, areas, and conditions under which systems will be applied, with Installer present, for compliance with requirements. Verify that surfaces and conditions are suitable prior to commencing work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.
- C. Ensure that surfaces are sound, dry, even, and free of oil, grease, dirt, excess mortar or other contaminants; concrete surfaces are cured and dry, smooth without large voids, spalled areas or sharp protrusions; masonry joints are flush and completely filled with mortar, and all excess mortar sitting on masonry ties has been removed.

3.02 SURFACE PREPARATION

- A. Clean, prepare, and treat substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for application.
- B. Mask and cover adjacent areas to protect from over spray or over pumping.
- C. Surfaces to receive foam insulation shall be clean, dry and properly fastened to ensure adhesion of the foam to the substrate.
- D. Ensure that all work by other trades is in place and complete.
- E. Ensure that surface preparation and any primers required conform to the manufacturers instructions.

3.03 INSTALLATION

- A. Pump foam into all exterior metal stud systems along entire exterior wall, full height, unless otherwise indicated.
- B. Apply in lifts or heights as recommended by manufacturer to full thickness indicated on plans. Thickness shall be a minimum of 4" unless indicated otherwise.
- C. Foam insulation to be free of voids and embedded foreign objects.
- D. Trim, as required, any excess thickness that would interfere with the application of items by other trades.
- E. Clean and restore surfaces soiled or damaged by work of this section. Consult with section of work soiled before cleaning to ensure methods used will not damage the work. Do not permit adjacent work to be damaged by work of this section. Damage to work of this section caused by other sections shall be repaired by this section at the expense of the subcontractor causing the damage.

3.04 PROTECTION

- A. Protect the foam from ultraviolet radiation when installed exposed to the elements.

SUBMITTAL CHECK LIST

- 1. Product Data.

END OF SECTION 07264

SECTION 07539 – THERMOPLASTIC OLEFIN SHEET ROOFING SYSTEM (TPO)

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 reinforced single-ply acrylic coated thermoplastic membrane system. In general, and not by way of limitation, work includes, but is not limited to, the following:
  - 1. Fully Adhered system at low slope roofs as specified herein: min ¼"/1'-0".
    - a. Insulation (extruded polystyrene flute fillers and 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 adhered to the overlayment board, and the laps are sealed by heat welding.
    - d. Work includes the installation of new insulation, saddles, sumps, blocking, roof membrane, fasteners, adhesives, copings, flashings, walkpads, 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 and color.
- 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 what is 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. Memorandum of Understanding (MOU) between the United States Environmental Protection Agency's "ENERGY STAR" Roof Products Program and Roofing Material Manufacturers.
  - 3. 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. Thermoplastic olefin 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 I" fire rating, FM Standard 4470.
  - 2. "Classification FM I-60 wind uplift rating per FM Loss Prevention Data Sheets 1-28 and 1-29.
- 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 751 Test Methods for Coated Fabrics.
    - i. D 1149 Test Method for Rubber Deterioration-Surface Ozone Cracking in a Chamber.
    - j. D 1822 Test Method for Tensile-Impact Energy To Break Plastics and Electrical Insulating Materials.
    - k. ASTM D1204 - Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature.
    - l. D 2137 Test Methods for Rubber Property-Brittleness Point of Flexible Polymers and Coated Fabrics.
    - m. D 5538 Practice for Thermoplastic Elastomers Terminology and Abbreviations.
    - n. D 5602 - Test Method for Static Puncture Resistance of Roofing Membrane Samples.

- o. D 5635 - Test Method for Dynamic Puncture Resistance of Roofing Membrane Samples.
  - p. E 84 – Test Method for Surface Burning Characteristics of Building Materials.
  - q. E 96 – Test Methods for Water Vapor Transmission of Materials.
  - r. E 108 – Test Methods for Fire Tests of Roof Coverings.
  - s. G 26 - Practice for Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials.
  - t. G 53 - Practice for Operating Light and Water Exposure Apparatus (Fluorescent UV/Condensation Type) for Exposure of Nonmetallic Materials.
  - u. G 155 Practice for Operating Light Exposure Apparatus (Xenon-arc Type) With and Without Water for Exposure of Non-Metallic Materials.
  - v. 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 and ESI.

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 roof edge system.
    - 3) The Contract Documents.
    - 4) The Applicator/Contractor/Installer.
    - 5) Warranty conditions specified.  
Submit certification letter acknowledging receipt of the specifications, intent to issue warranty, and intent to perform specified field inspections.
    - 6) **Confirmation existing roof warranty is maintained.**
  - 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.
  - f. Written certification that proposed roofing membrane meets the EPA "Energy Star" Roof Products Program specification for energy efficiency and that the manufacturer is listed as a Partner.

#### 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. **Bruce's Tri-State Roofing & Sheet Metal Co.**  
320 East 14th Street; Owensboro, KY 42303  
(270) 683-0610; (270) 683-3508 fax
3. **Blackmore and Buckner Roofing**  
1256 East Roosevelt Avenue, Indianapolis, IN 46202  
(317) 263-0707; (317) 263-0727 fax
4. **Commonwealth Roofing**  
1449 Hugh Avenue, Louisville, KY 40213-1916  
(502) 459-2216
5. **Geoghegan Roofing Corporation**  
1405 Garland Avenue; Louisville, KY 40210  
(502) 585-4313; (502) 585-5494 fax
6. **Hedinger Roofing**  
2803 Market Street; Jasper, IN  
(812) 482-5066
7. **Henry C. Smither Roofing**  
6850 E. 32nd Street; Indianapolis, IN 46226  
(317) 545-1304; (317) 546-4764 fax
8. **HRC Roofing & Sheet Metal**  
2845 Roadway Drive, Columbus, IN 47202  
(812) 372-8409, (812)-372-6836 fax
9. **Industrial Contractors, Inc.**  
401 N.W. First Street; Evansville, IN 47708  
(812) 464-7270; (812) 464-7399 fax
10. **Lehman Roofing, Inc.**  
2728 Mt. Vernon Avenue; Evansville, IN 47712  
(812) 426-1111; (812) 426-1114 fax
11. **Midwest Roofing and Sheet Metal, Inc.**  
1208 North Harlan Avenue; Evansville, IN 47711  
(812) 423-1138; (812) 423-7255 fax
12. **R. Adams Roofing**  
4990 Massachusetts Ave.; Indianapolis, IN 46218  
(317) 545-7663
13. **Roofing Services and Solutions, LLC (RSS)**  
1508 Fabricon Boulevard; Jeffersonville, IN 47130  
(812) 283-4490; (812) 283-6412 fax

14. **The Zero Company**  
4045 McCollum Court; Louisville, KY  
(502) 456-5848; (502) 456-5906 fax

- C. Manufacturer's Qualifications:
1. Must have a minimum of 20-year experience manufacturing thermoplastic 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.
  4. Must be a Partner in the EPA "Energy Star" Roof Products Program.

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, roof edge, 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 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.
  - 8. **Confirmation existing roof warranty is maintained.**

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 MANUFACTURER'S

Subject to compliance with the requirements on the Drawings and Specifications, the following manufacturer's are acceptable:

- A. "Firestone Building Products Co."  
Headquarters  
525 Congressional Blvd.  
Carmel, IN 46032-5607
- B. Contact the manufacturer's representative for any questions or requirements regarding the roofing system, membrane, insulation, warranty, accessories or details.

### 2.02 ROOF MEMBRANE SYSTEMS

- A. System Description:
  - 1. "Firestone" ULTRAPLY 120 TPO, fully adhered sheet roofing system.

- B. Thermoplastic Olefin Membrane Roofing Sheet Description:  
"Firestone", reinforced, ULTRAPLY TPO synthetic single-ply membrane composed of Thermoplastic Polyolefin polymer, and Ethylene Propylene Rubber.

1. Membrane Type: **.060 Reinforced TPO**

<b>1.00 Testing</b>	<b>PART 3 - Minimum Values</b>	<b>PART 4 - Typical values (SI Units)</b>
Thickness, min, mm (in.)		
Sheet-overall		0.060± 10%
Coating over scrim	0.381 (0.015)	0.024± 10%
Tensile strength, min, MPa (psi)	NA	
Breaking strength, min, kN (lbf)	1.0 (225)	350
Elongation, ultimate, min, %	NA	
Elongation at break, min, %	15%	30%
Tensile set, max, %	NA	
Tear strength, min, kN/m (lbf/in.)	NA	
Tearing strength, min, N (lbf)	80	86
Brittleness point, max, °C (°F)	-30 (-22)	-50
Ozone resistance, no cracks	Pass	Pass
<b>Properties after heat aging: (retained values)</b>		
Tensile strength, % min	NA	
Breaking strength, % min	90%	90%
Elongation, ultimate, % min	NA	
Elongation at break, % min	90% <sup>A</sup>	90%
Tear strength, % min	NA	
Tearing strength, % min	90%	90%
Weight Change (Mass), max %	±4%	±1%
Linear dimensional change, max, %	±2	-1.0
Water absorption, max, mass %	±4%	+1%
Factory seam strength, min, kN/m (lbf/in.)	75% of Sheet strength	75% of Sheet strength
<b>Weather resistance:</b>		
Visual inspection	Pass	Pass
Tensile strength, % min	NA	
Breaking strength, % min	90%	90%
Elongation, Ultimate, % min	NA	
Elongation at break, min, %	90%	90%
PRFSE, min, %	N/A	

- C. Roof Membrane:  
1. Approved Product:  
  a. "Firestone", ULTRAPLY 120 TPO membrane.
- D. Unsupported Flashing:  
1. Approved Product:

- a. "Firestone", ULTRAPLY TPO.
- 2. Description:
  - a. Non-reinforced, TPO, single-ply flashing composed of Thermoplastic Polyolefin polymer, and Ethylene Propylene Rubber.
  - b. Nominal Thickness: .60 inch.
- E. TPO Bonding Adhesive:
  - 1. Approved Product:
    - a. "Firestone", ULTRAPLY TPO Bonding Adhesive.
  - 2. Description:
    - a. Butyl-based, formulated for compatibility with the ULTRAPLY TPO membrane and a wide variety of substrate materials, including masonry, wood, insulation facings.
- F. Pourable Sealer:
  - 1. Description:
    - a. 2-Part urethane, 2-color reliable mixing.
- G. Seam Plates:
  - 1. Description:
    - a. Steel with barbs and a Galvalume coating.
  - 2. Reference Standard:
    - a. Corrosion-resistant to meet FM-4470 criteria.
- H. Termination Bar:
  - 1. Approved Product:
    - a. "Firestone", Firestone Termination Bar.
  - 2. Description:
    - a. 1.3" x 0.10" thick aluminum bar with integral caulk ledge.
- I. TPO Cut Edge Sealant:
  - 1. Approved Product:
    - a. "Firestone", UltraPly TPO Cut Edge Sealant.
  - 2. Polymeric sealant for use where exposed reinforcement is encountered.
- J. TPO General Purpose Sealant:
  - 1. Approved Product:
    - a. "Firestone", UltraPly TPO General Purpose Sealant.
  - 2. Polymeric one part general purpose sealant.
- K. TPO Coated Metal:
  - 1. Approved Product:
    - a. "Firestone", UltraPly TPO Coated Metal.
  - 2. Galvanized Steel with Manufacturers bonded TPO Coating.
- L. TPO Molded Flashing Accessories:
  - 1. Approved Products:
    - a. "Firestone", UltraPly TPO Pre-molded Flashing Accessories.
  - 2. Unreinforced UltraPly TPO membrane Pre-Molded for a variety of flashing details (i.e.; Pipe Boots, Inside-Outside corners, etc.).
- M. Edge Metal:
  - 1. Approved Product:
    - a. "Firestone", Anchorgard and "Firestone".



2. Description: Firestone: UT-RE-1; wind tested to meet ESI (min. 20 year warranty). Finish to match existing.
  - a. Provide prefabricated 24 gauge Steel with Kynar finish in manufacturers standard colors to be selected by the Architect.
  - b. Use where directed by the manufacturer to replace metal otherwise shown on the drawings.

N. Miscellaneous Flashing Accessories:

1. Types recommended by membrane manufacturer provided at locations indicated and at locations recommended by manufacturer, and including adhesive tapes, flashing cements, and sealants.
2. Refer to Section 07600 - Flashing , Sheet Metal, and Roof Accessories for any items not specified in this section, or otherwise provided by membrane manufacturer (even if not specifically identified in this section).
3. All accessories must be approved by the membrane manufacturer for full coverage under the manufacturer's warranty.

O. Roof Walkway Pads:

1. Description:
  - a. Non-reinforced ULTRAPLY TPO Walkway Pads.
  - b. .130" x 30" x 50' with Patterned traffic bearing surface.
2. Provide as indicated on Drawings. If not indicated, provide, around all rooftop equipment. Provide additional walkpads for access between rooftop equipment, and path from roof access point to ladder, whether or not indicated on Drawings.

P. Preformed Accessories:

1. "Firestone", ULTRAPLY TPO Molded inside corners.
2. "Firestone", ULTRAPLY TPO Molded outside corners.
3. "Firestone", ULTRAPLY TPO Molded pipe boots.
4. "Firestone", ULTRAPLY TPO T-Joint Covers.

- Q. 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. Contractors shall ensure that fasteners do not penetrate roof deck to exposed interior.
  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, with no change in contract price. Prime all plywood prior to membrane installation.**

2.05 ROOF INSULATION

- A. Approved Product:
  - 1. "Firestone", ISO 95+ Polyisocyanurate Insulation.
  
- B. Polyisocyanurate Board Insulation:
  - 1. Rigid cellular thermal insulation with glass-fiber reinforced polyisocyanurate closed-cell foam core and asphalt/glass fiber felt facing laminated to both sides.
  - 2. Complying with Federal Specification HH-I-1972/2.
  - 3. Aged R-value of 5.56 at 75°F respectively.
  - 4. Thickness 3.25 (nominal R-19)
  - 5. Nominal Size 48 inches x 48 inches.
  
- C. Reference Standards:
  - 1. FS HH-I-1972/Gen.
  - 2. FS HH-I-1973/3.
  - 3. ASTM C 209 – Water Absorption.
  - 4. ASTM E 96-Water Vapor Transmission of Materials.
  - 5. ASTM D 1621 – Compressive Strength.
  - 6. ASTM D 1622 – Density.
  - 7. ASTM D 2126 – Dimensional Stability.
  - 8. ASTM E 84 – Flame Spread.
  
- D. Tapered Polyisocyanurate Insulation:  
Contact the manufacturer's representative for any Tapered Design Assistance.
  
- E. Mechanical Anchors:
  - 1. Approved Product:
    - a. "Firestone", Heavy-Duty (HD) fasteners.
  - 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.
4. Reference Standard:
- a. SAE 1022, Heat Treated.
- F. Adhesive Anchoring:
- 1. Where required, use high velocity insulation adhesive as recommended by membrane manufacturer and meeting FM 1-90.
- G. Verify insulation furnished is compatible with and suitable for the specified roofing system, including roofing condition, installation procedures and type of membrane to be used.
- H. Unless indicated otherwise on the Drawings, insulation is to be installed in two layers (one layer allowed for thickness up to 2 inches) in thickness indicated (not including tapered saddles). Tapered insulation areas to be provided in thickness and slope indicated (not including tapered saddles), or if not indicated, minimum 1/2 inch per foot slope. Thickness indicated on Drawings does not include overlayment board, saddles and crickets.
- I. Saddles and Crickets:
- 1. Tapered polyisocyanurate board.
  - 2. Supplied and warranted by roof membrane manufacturer.
  - 3. Satisfies UL and FM test requirements and roof membrane manufacturers requirements for installation and warranty.
  - 4. Slope as required to direct water away from item saddle is protecting, minimum 1/2 inch per foot.

## 2.06 OVERLAYMENT BOARD

- A. Provide one of the following products, pending compliance with the manufacturer's warranty:
- 1. "Georgia Pacific", "Dens Deck".
  - 2. "Firestone", "Coverdeck 250".
  - 3. "Firestone", "IsoGard HD Coverboard".
- 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.
- 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. "Firestone", ISO 95+ GL and 1/4 inch "Georgia Pacific", "Dens Deck".
  - 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 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.
- C. Hot Air Welding of Seams:
  - 1. Clean all seams and hot air weld to exposed sheet edges as recommended by manufacturer.
  - 2. All seams must be hot-air welded.
  - 3. Welding equipment must be approved by membrane manufacturer. All field and flashing splices on the horizontal surface are to be completed using an automatic heat welder that has been designed for hot air welding of Thermoplastic Olefin membranes. Hand welders are only to be used on vertical welds or where an automatic welder is not practical or cannot be used.
  - 4. All welding mechanics must complete factory training course provided by membrane manufacturer.
  - 5. Provide portable generators or temporary electric service for welding equipment. Do not use electrical power supply on existing building without written permission from Owner and Architect. Comply with all codes for electric supply, grounding, and overcurrent protection.
  - 6. Check all welded seams for continuity using a rounded screwdriver, or cotter pin puller type tool. Do not probe welds until they have cooled to ambient temperature. On-site evaluation of welded seams to be made daily by the Contractor at locations as directed by the Architect, the Owner's Representative, or the membrane manufacturer. One-inch wide cross section samples of welded seams shall be taken at least three times a day. Correct welds which display failure from shearing of the membrane prior to separation of the weld on the same day weld was made. Patch all test cuts.
  - 7. Seams made with automatic welder shall be a minimum 1-1/2 inches wide. Seams made with an automatic welder to be minimum 2 inches wide. Roll all seams as the work progresses with silicone coated steel hand roller.
- D. Install 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 an 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 B., above.
  3. Do not apply adhesive in seam areas that are to be welded.
  4. Install transition material at base of all transitions, peaks and valleys as required by manufacturer.
  5. Extend all flashing a minimum of 8 inches above roofing level, unless approved in writing by manufacturer and Architect.
  6. Mechanically fasten all flashing membranes along the counter flashed top edge. Provide termination bar, sealant, and counterflashing at all terminations.
  7. 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. If project is retrofit or Tear-Off remove all existing flashings (i.e., lead, asphalt, mastic, etc.).
    - b. Flash all penetrations passing through the membrane.
    - c. The flashing seal must be made directly to the penetration.
  2. Pipes, Round Supports, etc.:
    - a. Flash with Firestone Pre-Molded UltraPly TPO Pipe Flashings where practical.
    - b. Flash using UltraPly TPO 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. Roof Drains:
    - a. Provide a clean even finish on the mating surfaces between the clamping ring and the drain bowl.
    - b. Taper insulation around the drain to provide a smooth transition from the roof surface to the drain. Use pre-manufactured tapered insulation with facer or suitable bonding surface to achieve slope. Slope shall not exceed Firestone recommendations.
    - c. Position the UltraPly TPO membrane, then cut a hole for the roof drain to allow 1/2 inch - 3/4 inch of membrane extending inside the clamping ring past the drain bolts.
    - d. Make round holes in the UltraPly TPO membrane to align with clamping bolts. Do not cut the membrane back to the bolt holes.
    - e. Place Water Block Seal on top of drain bowl where the clamping ring seats below membrane.
    - f. Install the roof drain clamping ring and clamping bolts. Tighten the clamping bolts to achieve constant compression.
  5. 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 Firestone Details.
    - c. Fill penetration pockets with Pourable Sealer, so as to shed water.
  6. Hot Pipes:
    - a. Protect the UltraPly TPO 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 Firestone details.

7. Flexible Penetrations:
  - a. Provide a weather tight gooseneck set in Water Block Seal and secured to the deck.
  - b. Flash in accordance with Firestone Details.
8. Expansion Joints:
  - a. Install as shown on roof drawings in accordance with Firestone details.

- G. Walkpads:
1. Install walkpads according to manufacturer's instructions.
  2. Pads to be installed straight, even, and in line with building walls.
  3. Turns are to be at right angles.
  4. Install walk pads where indicated on drawings, or if not indicated, around any rooftop mechanical units (RTU's), and as otherwise indicated. Pads must be heat welded, and not applied using adhesive.

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.
- B. Remove markings from finished surfaces.
- C. Repair or replace defaced or disfigured finishes caused by work of this Section.
- D. Contractor is to wash the entire roof membrane with a light powerwash immediately following completion of the membrane installation. Repeat process as required throughout the construction process to keep white and light membrane and reflectivity as intended by the use of the product. Contractor is to assure removal of all debris, markings, adhesive, footprints, dirt, mud and other marrings and defamation of the membrane surface. Acceptability to be determined by the Architect.

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 07539



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 edge flashing. (See Section 07539 – Thermoplastic Olefin Sheet Roofing System (TPO) for roofing system flashing).
  - 2. Wall flashing and expansion joints.
  - 3. Exposed metal trim/fascia units.
  - 4. Miscellaneous sheet metal accessories.

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 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 match existing.
  - 1. Custom color may be required to produce a match for 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.
  
- B. Aluminum:
  - 1. ASTM B 209, Alloy 5005-H134.
  - 2. Thickness (minimum):
    - a. .032 inches, or as otherwise indicated on Drawings.
  - 3. Finish: Fluoropolymer enamel.
  
- C. Copper:
  - 1. ASTM B 370, cold rolled sheet.
  - 2. Weight: 16 oz.
  
- D. Lead Coated Copper:
  - 1. ASTM B 101, Class A, cold rolled sheet.
  - 2. Weight: 16 oz.
  
- E. Solder:
  - 1. ASTM B 32.
  - 2. 50-50 Block tin and pig lead; 40-60 lea and tin for lead coated copper.
  
- F. Fasteners:
  - 1. Stainless Steel nails, flat-head.
  - 2. Galvanized steel, hot dipped, flat head.
  - 3. Hard copper, brass or bronze, flat-head, 12 gauge for copper and lead coated copper.
  
- G. Cleats:
  - 1. 2 inches wide, 3 inches long piece of sheet metal.
  - 2. 16 oz., unless otherwise specified.
  
- H. Flux:
  - 1. Rosin or muriatic acid neutralized with zinc.
  
- I. Bituminous Paint:
  - 1. Asphalt emulsion, ASTM D 1187, Type A.
  
- J. Sealant:
  - 1. One-part butyl rubber sealant, FS TT-S-00657, Type 1.
  
- L. 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.
  
- M. Coil Stock:
  - 1. "Alcoa Aluminum" with Almalure 2000, 2-coat acrylic topcoat resin.

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. Remove acid flux residue by neutralizing and scrubbing with ammonia or washing with soda solution. Rinse with clean water.
- C. Tin edges of plain copper sheets to be soldered for a width of 1-1/2 inches both sides with solder.
- D. Seams:
  - 1. Make seam in direction of flow.
  - 2. Seams must be soldered or locked, unless otherwise approved.
  - 3. Standing seams shall finish not less than 1" high unless otherwise specified.
  - 4. Flat-Lock Seams, Soldered and unsoldered: Finish not less than 3/4" wide.
  - 5. Lap Seams, Soldered: Finish not less than 1" wide.
  - 6. Lap Seams, Unsoldered: Overlap 3" unless otherwise noted.
  - 7. Loose-Lock Seams, Unsoldered: 3" common, or hook, seam, filled with sealant.
- E. All exposed edges not seamed shall be hemmed, bent back 1/2 inch to unexposed side.
- F. 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.

2.03 PRE-MANUFACTURED METAL ROOF EDGE

See Section 07539 – Thermoplastic Olefin Sheet Roofing System (TPO)

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. Base Flashing:
  - 1. On roofing where shown, extend flashing up vertical surfaces not less than 8 inches unless otherwise shown, and 4 inches horizontally out on the roof.
- B. Insert Flashing:
  - 1. Preform, interlock and bed insert flashing, extend horizontally from face of wall to backing, extend vertically and insert in reglet: Secure as hereinafter specified.

- C. Counterflashing:
  - 1. Overlap base flashing 4 inches.
  
- D. Securing Flashing and Reglets:
  - 1. Open Slot Reglets:
    - a. Turn sheet metal into open slot reglets and secure with lead or copper plugs at approximately 12 inches o.c.
  - 2. Friction Type Reglets:
    - a. Turn sheet metal into friction type reglets and secure by indenting slot 12 inches o.c. with a dull punch or by means of “thumbnail” notches in sheet metal at 12 inches o.c.
  
- E. Cleats:
  - 1. Where required to retain flashing, provide cleats specified, spaced not more than 12 inches o.c. Secure one end with two nails and fold clip back over nail heads. Lock free end of cleat into seam or into folded edge of sheet metal.
  
- F. Roof Penetration Flashing: See Section 07539 – Thermoplastic Olefin Sheet Roofing System (TPO)
  
- G. Reglets:
  - 1. Install in accurate location, straight in-line, with leakproof joints.
  
- H. Drip Edge:
  - 1. Extend 4 inches wide up from eave edge full eave length.
  - 2. Set into asphalt flashing cement, full width.
  - 3. Secure with aluminum annular ring nails 12 inches o.c.

3.03 CLEANING AND PROTECTION

- A. Remove all flux, scraps and dirt as work progresses. Neutralize excess flux with a 5 to 10 percent solution of washing soda and surface drenched with clean water.
  
- B. 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 07650 - FLEXIBLE FLASHING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Flexible flashing as shown for drawings and specified herein. Including, but not limited to thru-wall flashing and other flashing for masonry work.

1.02 SUBMITTALS

- A. Submit manufacturer's data sheets for each product used.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS AND TYPES

- A. Provide one of the following or an approved equivalent:
  - 1. "AFCO" Cop-A-Bond Duplex.
  - 2. "York Manufacturing" Cop-R-Tex Duplex.
  - 3. "Advanced Building Products" Cop-R-Kraft Duplex.

2.02 MATERIAL

- A. Copper:
  - 1. Full sheet copper.
  - 2. 2 oz. per square foot.
  - 3. Bonded on both sides with kraft paper and asphalt, waterproofed.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Whether shown on Drawings or not, install flashing at the following locations:
  - 1. Install at heads and sills of all openings in walls, base courses, sill courses, angles and wall penetrations. Install end dam flashing at all storefront systems.
  - 2. Install thru-wall flashing at top course of all brick walls at retaining walls, planter walls and ramps, and all other similar conditions.
  - 3. Coordinate flashing with weep hole installation.
- B. Extend flashing 6" beyond opening or joint.
- C. Build in flashing with mortar as masonry work progresses.

SUBMITTAL CHECK LIST

- 1. Manufacturer's material data sheet.

END OF SECTION 07650

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.
- D. Safety Rail:
1. Basis of Specification: "Bilco", Type "SEF", Bil-Guard.
  2. Performance characteristics:
    - a. Hatch rail system shall attach to the capflashing of the roof hatch and shall not penetrate any roofing material.
    - b. Hatch rail system shall satisfy the requirements of OSHA 29 CFR 1910.23 and shall meet OSHA strength requirements with a factor of safety of two.
    - c. UV and corrosion resistant construction with a twenty-five year warranty.
    - d. Self-closing gate shall be provided with hatch rail system.
  3. Posts and Rails: Shall be round pultruded reinforced fire retardant yellow fiberglass treated with a UV inhibitor.
  4. Hardware: Mounting brackets shall be 1/4" thick hot dip galvanized steel. Hinges and post guides shall be 6063T5 aluminum. Fasteners shall be Type 316 stainless steel.

### 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 07840 - FIRESTOPPING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Firestopping for fire-rated construction, this includes:
1. All openings in fire rated wall assemblies, both blank (empty) and those accommodating penetrating items such as cables, conduits, pipes ducts, etc.
  2. Gaps (openings) between exterior entries, storefronts and curtain walls and the outer perimeter edge of the structural floor.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 03300 - Cast-In-Place Concrete  
Section 04220 - Concrete Unit Masonry  
Section 07900 - Joint Sealers  
Section 09250 - Gypsum Drywall – Metal Stud Construction  
Division 15 - Mechanical, Plumbing and Sheet Metal  
Division 16 - Electrical Work

1.03 REFERENCES

- A. American Society for Testing and Material Standards (ASTM):
1. ASTM E814-88: Standard Test method for Fire Tests of Through-Penetration Firestops.
- B. Underwriters Laboratories, Inc. (UL):
1. UL 1479 Fire Tests of Through Penetration Firestops (Consult UL Fire Resistance Directory).

1.04 QUALITY ASSURANCE

- A. Firestopping systems (materials and design) shall conform to both Flame (F) and Temperature (T) ratings as required by local building code and as tested by nationally accepted test agencies per ASTM E814 or UL 1479 fire tests in a configuration that is representative of field conditions. The F rating must be a minimum of one (1) hour but not less than the fire resistance rating of the assembly being penetrated. T rating when required by code authority shall be based on measurement of the temperature rise on penetrating item(s). The fire test shall be conducted with a minimum positive pressure differential of 0.01 inches of water column.
- B. Firestopping materials and systems must be capable of closing or filling through-openings created by:
1. The burning or melting of combustible pipes, cable jacketing, or pipe insulating materials, or
  2. Deflection of sheet metal due to thermal expansion (electrical & mechanical duct work).
- C. Firestopping material shall be asbestos free and shall not incorporate nor require the use of hazardous solvents.
- D. Firestopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surfaces.
- E. Do not use any firestopping products which after curing dissolve in water.
- F. All firestopping materials shall be manufactured by one manufacturer (to the maximum extent possible).
- G. Installation of Firestopping systems shall be performed by a contractor (or contractors) trained or approved by the Firestop manufacturer.



- H. Installation of firestopping systems shall be performed by a contractor (or contractors) trained or approved by the firestopping manufacturer.
- I. Equipment used shall be in accordance with the Manufacturer's written installation instructions.

1.05 SUBMITTALS

- A. Manufacturer's Data Sheets:
  - 1. Submit manufacturer's product literature for each type of firestopping material to be installed. Literature shall indicate product characteristics, typical uses, performance and limitation criteria and test data.
  - 2. Material Safety Data Sheets (MSDS) for each firestop product.
  - 3. Submit manufacturer's installation procedures for each type of product.
- B. Shop Drawings:
  - 1. Show typical installation details for the methods of installation.
  - 2. Indicate which firestop materials will be used, where, and thickness for different hourly ratings.
- C. UL Test Data:
  - 1. Submit UL test data sheet and assembly information.
  - 2. Identify by UL number the system for which the product comprises, or is a part of.
  - 3. Identify approved tested hourly rating.
  - 4. Identify flame (F) and temperature (T) ratings.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver material in the manufacturer's original, unopened containers or packages with the manufacturer's name, product identification, lot number, UL label and mixing and installation instructions as applicable.
- B. Store materials in the original, unopened containers or packages, or under conditions recommended by the manufacturer.
- C. All firestopping materials shall be installed prior to expiration of shelf life.

1.07 PROJECT CONDITIONS

- A. Conform to Manufacturer's printed instructions for installation and when applicable, curing in accordance with temperature and humidity. Conform to ventilation and safety requirements.

1.08 SEQUENCING

- A. Coordinate this work as required with the work of other trades.
- B. Firestopping shall precede gypsum board finishing.

1.09 PROTECTION

- A. Where firestopping is installed at locations which will remain exposed in the completed work, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and protect as necessary against damage from other construction activities.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Firestopping materials and systems shall meet the requirements specified herein.
- B. Architect must approve in writing any alternates to the materials and systems specified herein.

- C. All firestop products and systems shall be designed and installed so the basic sealing system will allow the full restoration of the thermal and fire resistance properties of the barrier being penetrated with minimal repair if penetrants are subsequently removed.

## 2.02 ACCEPTABLE MANUFACTURERS

- A. Provide products, as approved by the Architect, by one of the following approved manufacturers:
  1. "Specified Technologies Inc." (STI)
  2. "Dow Corning Corp." (Dow)
  3. "3M Fire Protection Products" (3M)

## 2.03 MATERIALS

- A. Firestop Mortar:
  1. "STI", SpecSeal Mortar.
- B. Firestop Sealants and Caulks:
  1. "STI SpecSeal Sealant
  2. "Dow", Firestop Sealant No. 2000
  3. "3M", CP25WB+ Caulk
- C. Firestop Putty:
  1. "STI", SpecSeal Firestop Putty Bars and Pads
  2. "3M", MPS-2 Moldable putty Stix and Putty Pads
- D. Firestop Collars:
  1. "STI", SpecSeal Firestop Collars
  2. "3M", PPD Collars
- E. Wrap Strips:
  1. "STI", SpecSeal Wrap Strip
  2. "3M", FS-195 Wrap Strip
- F. Accessories:
  1. Forming/Damming Materials: Mineral fiberboard or other type recommended by Manufacturer.

## PART 3 - EXECUTION

### 3.01 INSPECTION

- A. Examine the areas and conditions where firestoppings is to be installed and notify the Architect of conditions determined to the proper and timely completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected by the contractor in a manner acceptable to the Architect.
- B. Verify that environmental conditions are safe and suitable for installation of firestopping products.

### 3.02 CONDITIONS REQUIRING FIRESTOPPING

- A. General:
  1. All through-penetrations, construction gaps, joints and through openings occurring in, adjacent to or between fire-rated walls.
  2. Insulation types specified in other Sections shall not be installed in lieu of firestopping material specified herein.
  3. All combustible penetrants (I.E. non-metallic pipes or insulated metallic pipes) shall be firestopped using products and systems tested in a configuration representative of the field condition.

### 3.03 INSTALLATION

#### A. General:

1. Installation of firestopping shall be performed by a applicator/installer qualified and trained by the manufacturer. Installation shall be performed in strict accordance with manufacturer's detailed installation procedures.
2. Apply firestopping in accordance with fire test reports, fire resistance requirements, acceptable sample installations, and manufacturer's recommendations.
3. Coordinate with plumbing, mechanical, electrical and other trades to assure that all pipe, conduit, cable and other items which penetrate fire-rated construction have been permanently installed prior to installation of firestopping. Schedule and sequence the work to assure that partitions and other construction which would conceal penetrations are not erected prior to the installation of firestopping.
4. Unless specified and approved, all insulations used in conjunction with through-penetrants shall remain intact and undamaged and may not be removed.

#### B. Dam Construction:

1. When required to properly contain firestopping materials within openings, damming or packing materials may be utilized. Combustible damming material must be removed after appropriate curing. Noncombustible damming materials may be left as permanent component of the firestopping system.

#### C. Field Quality Control:

1. Prepare and install firestopping systems in accordance with manufacturer's printed instructions and recommendations.
2. Follow safety procedures recommended in the Material Safety Data Sheets.
3. Finish surfaces of firestopping which are to remain exposed in the completed work to a uniform and level condition.
4. All areas of work must be accessible until inspection by the applicable Code Authorities.
5. Correct unacceptable firestops and provide additional inspection to verify compliance with this specification at no additional cost.

### 3.04 CLEANING

1. Removing spilled and excess materials adjacent to firestopping without damaging adjacent surfaces.
2. Leave finished work in neat, clean condition with no evidence of spillovers or damage to adjacent surfaces.

### SUBMITTAL CHECKLIST

1. Manufacturer's Data Sheets.
2. Shop Drawings.
3. UL Test Data.

END OF SECTION 07840

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. Acoustical Sealants.
  - 4. Acoustical Duct Gaskets.
  - 5. Waterstop.
- 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. Acoustical partition walls joints and entire perimeter.
  - 7. Mechanical ducts through acoustical partition walls.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Refer to Division 3 - concrete surfaces.
- 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.

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. Manufacturers of Non-Elastomeric Sealants (Liquid/Tape):
    - a. "Sonneborn / BASF Building Systems"
    - b. "Tremco, Inc."
    - c. "Capital Services"
    - d. "DOW Corning"
  3. Manufacturers of Joint Fillers/Sealant Backers:
    - a. "Sonneborn / BASF Building Systems"
    - b. "Backer Rod Mfr. & Supply Co."
    - c. "Williams Products, Inc."
  4. Manufacturers of Waterstop:
    - a. "Volclay"

2.03 ELASTOMERIC SEALANTS

- A. For use 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 ACOUSTICAL SEALANTS

- A. Description:
  - 1. Sealant engineered for acoustical isolation in partition walls.
  - 2. Non-hardening, non-cracking, non-skinning.
  - 3. One-component butyl sealant.

- B. Performance:
  - 1. Flexibility:  
Comply with ASTM C-711-72 for no cracking or loss of adhesion.
  - 2. Weatherability:  
Comply with ASTM D750-68 for no cracking, bleeding or loss of rubber characteristics.
  
- C. Installation:
  - 1. Install at the following locations and conditions in all interior acoustical partition walls, whether specifically indicated or not on the drawings:
    - a. All perimeter joints of overall wall surface to adjacent construction.
    - b. All joints between individual wall panels.
    - c. All perimeter surfaces of items penetrating the wall surfaces.
    - d. All small openings or penetrations through wall surfaces.
    - e. Bedding all electrical receptacle and switch boxes into wall surface.
    - f. Along all edges of stud wall bottom plate to floor, both sides of wall, prior to install of wallboard.
    - g. Along all edges of stud wall top plate to ceiling or structure, both sides of wall, prior to install of wallboard.
  
- D. Acceptable Products:
  - 1. "QuietSeal", QS-350.
  - 2. "Titebond", Acoustical Sound Sealant.
  - 3. "Grabber", Acoustical Sealant GSCS.
  - 4. "Lapage", PL Acousti-Seal.

#### 2.07 ACOUSTICAL DUCT GASKET

- A. Description:
  - 1. Flexible vinyl sheet bonded to a layer of reinforced aluminum foil on both faces engineered to reduce sound transmission where installed.
  - 2. 0.10" (3mm) thick barium sulphate vinyl sheet.
  - 3. Nominal density of 1.0 lbs/sf.
  - 4. Minimum sound transmission loss STC=26.
  
- B. Installation:
  - 1. Install at all mechanical duct penetrations through all interior acoustical partition walls, whether specifically indicated or not on the drawings:
  - 2. Wrap a single layer of material around the entire perimeter of the duct surface to form a complete barrier on surface through the entire wall thickness.
  - 3. Material should carry continuously through the entire wall penetration.  
Continue material on ductwork a minimum of 48" from the wall surface, both sides of wall where possible. Where not possible, end material edge flush with finished surface on front face side of wall.
  - 4. Install additional layers of material through the entire wall thickness as required to completely infill the penetration void so as to create a tight gasket around ductwork through the wall penetration.
  
- C. Acceptable Products:
  - 1. "Kinetics Noise Control", #KNM-100AL/AL, Cross Talk Barrier Material.

#### 2.08 WATERSTOP

- A. Description:
  - 1. Waterstop for use on exterior vertical and horizontal joints and penetrations through concrete.
  - 2. Flexible, active, swelling waterstop to provide a positive seal upon contact with water.
  - 3. Consists of 75% sodium bentonite and 25% butyl rubber compound.
  - 4. Performance standards to comply with ANSI/NSF 61.

- B. Protection of concrete joints and penetrations:
  - 1. Install to form a continuous waterstop along entire joint or perimeter of penetration.
  - 2. Adhere to concrete with manufacturer's adhesive.
  
- C. Acceptable Products:
  - 1. "Volclay", Waterstop-RX.

### 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.

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 steel frames for wood doors.
  3. Hollow metal window-walls, glazed openings, and other hollow metal frames for glass.
  4. Rough bucks, frame reinforcing, door reinforcing, door insulation, closer reinforcements, clip angles and anchorage.
  5. Factory prime paint finish.
  6. 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 08211 - Flush Wood Doors.  
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. Atlas Companies.
  2. CECO Door Products.
  3. Curries.
  4. Deansteel Manufacturing Company, Inc.
  5. Fenestra.
  6. Kewanee Corporation.
  7. Mesker.
  8. Metal Products.
  9. Pioneer Industries, Inc.
  10. Republic Builders Products.
  11. Steelcraft Manufacturing Company.

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. Galvanealed Steel Sheets:
1. ASTM A924, A60 zinc coating.
  2. Use galvanealed steel sheets at the following locations, whether indicated or not:
    - a. All exterior doors and door frames.
    - b. All doors and frames in kitchens, locker rooms and restrooms.
    - c. All doors and frames in any other area that is exposed to moisture for long periods of time.
    - d. All door louvers and other components within doors that require galvanealed steel sheets.
  3. Internal reinforcing may be manufactured of hot rolled pickled and oiled steel per ASTM-A569.
- C. 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.
- D. Inserts, Bolts and Fasteners:
1. Manufacturer's standard units, except hot-dip galvanize items to be built into exterior walls.
- E. Drip Cap:
1. On all exterior door bottoms.
  2. On all exterior door frame heads.
- F. 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. Galvanealed Steel Sheets:

1. ASTM A924, A60 zinc coating.
2. Internal reinforcing may be manufactured of hot rolled pickled and oiled steel per ASTM-A569.

C. 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.
  - d. 14 gauge: Exterior door frames.
  - e. 14 gauge: Typical labeled exterior frames.
  - f. 14 gauge: Exterior glazed window and opening frames.
2. Doors:
  - a. 18 gauge: Interior doors.
  - b. 18 gauge: Typical labeled interior doors.
  - c. 16 gauge: Exterior doors.
  - d. 16 gauge: Typical labeled exterior 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. Insulate core of all exterior doors, whether indicated or not, and interior doors where indicated:
  - a. Insulate with 1 lb minimum density insulation.
  - b. Minimum insulation value R-2 minimum.
7. 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.

8. Exterior Hollow Metal Door Louvers: Fabricate louver units of 16-gauge galvanized steel sheets with stationary, weatherproof Z-shaped blades and U-shaped frames, not less than 1-3/8 inch thick. Space louver blades not more than 1-1/2 inch o.c. Assemble units by welding. Provide insect screen on interior side of frame, consisting of 14 by 18 wire mesh in rigid, formed metal frame.
9. 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.
10. 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.
11. 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.
12. 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.
13. **All exterior metal doors to be Galvanealed Steel Sheets.**

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.
17. **All exterior metal frames to be Galvanealed Steel Sheets.**

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. Sill at carpet 1/4 inch above carpet.
  
- 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 08211 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Interior flush pre-fit, pre-machined standard and fire rated type wood doors as shown on the Drawings and specified herein.
- B. Modifications to existing doors receiving new door hardware, where applicable.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 08110 - Steel Doors and Frames.
- Section 08710 - Finish Hardware.
- Section 08800 - Glass and Glazing.
- Section 09900 - Painting.

1.03 REFERENCES

- A. WDMA - Window and Door Manufacturers Association: IS 1-A 1997 Industry Standard for Architectural Flush Wood Doors.
- B. NFPA-80: Standards for Fire Doors 1999 Edition.
- C. Uniform Building Code: UBC 7-2 1997 or UL10C, Positive Pressure Fire Door Assemblies. Category "B" for single swing doors and Category "A" for pairs of swinging doors.
- D. NFPA-105: Recommended Practice for Installation of Smoke-Control Door Assemblies, 1999 Edition.
- E. NFPA-252: Standard Method of Fire Tests for Door Assemblies.
- F. UL: Building Materials Directory.
- G. WHI: Directory of Listed Products.
- H. ICC/ANSI-A117.1-2003: Accessible and Usable Buildings and Facilities.
- I. State and Local Building Codes including the Authority Having Jurisdiction.

1.04 QUALITY ASSURANCE

- A. Except as otherwise specified herein, wood doors shall conform with Architectural Woodwork Institute (AWI) Quality Standards and National Woodwork Manufacturer's Association (NWMA) I.S. 1 and I.S. 2.
- B. Fire-Rated Wood Doors: Provide wood doors which are identical in materials and construction to units tested in door and frame assemblies in accordance with UBC 7-2 1997 or UL10c, Positive Pressure Fire Door Test Method, and which are labeled and listed for ratings indicated by ITS - Warnock Hersey, UL or other testing and inspection agency acceptable to authorities having jurisdiction.
  - 1. Doors: Comply with UBC 7-2 1997 or UL10C where required.
  - 2. Provide smoke gaskets or fire seals as required by manufacturers' individual authorities in compliance with UBC 7-2 1997 or UL-10C-1998.
  - 3. Maintain one copy of each compliance document on the project site.
  - 4. Fabrication of doors shall permit installation in accordance with NFPA Standard No. 80.
  - 5. Fire doors to be rated UL10C Positive Pressure Category A.

- C. WDMA I.S. 1-A 2004 Quality Standard: Window and Door Manufacturers Association Quality Standards for grade of door, core, construction, finish, and other requirements.
- D. Manufacturer must have qualifications specializing in the manufacturing of the products specified in this Section for a period of not less than 10 years.

1.05 SUBMITTALS

- A. Manufacturer's Literature:
  - 1. Manufacturer's published catalog data, product data sheets and cutsheets.
  - 2. Certificate of compliance with NWMA I.S. 1.
  - 3. Indicate general construction, jointing methods, hardware and louver locations, locations of cut-outs for glass, thickness of veneers, materials, door swings, special blocking, stile and rail dimensions, undercuts, and storage and installation details. Do not proceed with any fabrication until all details are approved.
- B. Shop Drawings:
  - 1. Show elevations, dimensions, construction details, glazing, cut-outs and label.
- C. Samples:
  - 1. Actual samples of wood veneer and finish.
  - 2. Stain colors and finishes to be selected from manufacturer's entire standard selection.
  - 3. If stains are required to be custom matched, submit samples of actual finished product, along with sample of item door was to be matched to.
- D. Warranty:
  - 1. Manufacturer's standard warranty for materials.
  - 2. Special Warranty as specified herein.
- E. Certification:
  - 1. Submit any information necessary to indicate compliance to all of these specifications.
  - 2. All labeled fire door assemblies to be of a type which have been classified and listed in accordance with the latest edition of NFPA 80 and tested in compliance with NFPA-252, and UL-10B, and UBC-7-2.
  - 3. A metal label is to be permanently affixed to the fire door at an authorized facility. Furthermore, all, 45, 60, and 90 minute labeled fire doors, are to have manufacturer's standard laminated stiles for improved screw holding and split resistance capabilities.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver doors to the site until building has been closed in and is thoroughly dry.
- B. Deliver pre-finished wood doors to jobsite after all door frames have been painted, and all "wet" construction has been completed.
- C. Plastic wrap and protect wood doors during transit, storage and handling, to prevent damage, soiling or deterioration. Follow the Care and Installation guidelines as described in WDMA I.S. 1-A 2004.
- D. Store doors flat and protect from damage.
- E. Do not walk or stack any materials on top of any wood doors delivered to the jobsite, and do not drag any wood doors across each other during delivery or installation.
- F. Remove damaged or otherwise unsuitable doors from the job site.

1.07 SPECIAL WARRANTY

- A. The Contractor shall warrant the wood doors to be free of faults and defects for the life of the installation.
- B. Faults and Defects:
  - 1. Delamination in any degree.
  - 2. Warp or twist of 1/4" or more, in any 7'-0" plane, in any direction.
  - 3. Telegraphing of stile, rail, or core, through the face of the door to cause surface variation in excess of 1/100" in any 3" span.
  - 4. Any other defect that shall affect the operation of the door, shall be considered a defect under the provision of the warranty.
- C. Warranty to include refinishing and reinstallation that may be required due to repair or replacement of any defective doors.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide products, as approved by the Architect, by one of the following acceptable manufacturers:
  - 1. Algoma Hardwoods.
  - 2. Chappell.
  - 3. Eggers Industries.
  - 4. Graham Manufacturing.
  - 5. Ideal Wood Products.
  - 6. Marshfield Door Systems.
  - 7. Mohawk Flush Doors.
  - 8. Ohio Valley.
  - 9. Oshkosh.
  - 10. VT Industries.

2.02 FABRICATION

- A. Typical Doors, Non-Fire Rated:
  - 1. Thickness: 1-3/4 inches.
  - 2. Interior flush, bonded, solid core, hardwood veneered.
  - 3. Door construction shall conform to WDMA I.S. 1-A 2004 Premium Grade and AWI Quality Standards Premium Grade.
  - 4. Core: bonded particle core (PC).
    - a. Solid particleboard bonded to the stiles and rails.
    - b. Comply with ANSI-A208-1 Grade 1-LD-2.
  - 5. Vertical Stiles: Hardwood to match face veneer, 1-3/8" minimum before trimming, over structural composite lumber (SCL), glued to core.
  - 6. Rails: Mill option hardwood or SCL. Top and bottom: 2 inches before trimming.
  - 7. Facing: Wood veneer cut and species as specified shall conform to WDMA I.S. 1-A 2004 "A" grade for Premium Grade Door Construction requirements.
  - 8. Crossbands: Hardwood, 1/16 inches thick, extending full width of door.
  - 9. Edge Bands: Same species as face veneer, matched for color.
- B. Fire Rated Doors (20 Minute Rating):
  - 1. Thickness: 1-3/4 inches.
  - 2. Interior flush, bonded, solid core, hardwood veneered.
  - 3. Door construction shall conform to WDMA I.S. 1-A 2004 Premium Grade and AWI Quality Standards Premium Grade.

4. Core: bonded particle core (PC).
    - a. Solid particleboard bonded to the stiles and rails.
    - b. Comply with ANSI-A208-1 Grade 1-LD-2.
  5. Vertical Stiles: Hardwood to match face veneer, 1-3/8" minimum before trimming, over structural composite lumber (SCL), glued to core.
  6. Rails: Mill option hardwood or SCL. Top and bottom: 2 inches before trimming.
  7. Facing: Wood veneer cut and species as specified shall conform to WDMA I.S. 1-A 2004 "A" grade for Premium Grade Door Construction requirements.
  8. Crossbands: Hardwood, 1/16 inches thick, extending full width of door.
  9. Edge Bands: Same species as face veneer, matched for color.
  10. Undercut doors only where required. See Sheet M-101.
- C. Fire Rated Doors (45 Minute Rating and Higher):
1. Thickness: 1-3/4 inches.
  2. Interior flush, bonded, solid core, hardwood veneered.
  3. Door construction shall conform to WDMA I.S. 1-A 2004 Premium Grade and AWI Quality Standards Premium Grade.
  4. Core: bonded mineral core (FD).
    - a. Non-combustible mineral core containing no asbestos.
  5. Vertical Stiles: Laminated hardwood to match face veneer over mineral composite, glued to core, and laminated prior to field fitting.
  6. Rails: Fire-rated mineral composite materials (Firestop), as required by fire door authorities. Top and bottom: thickness before trimming as required by manufacturer's fire door authorities. Meet requirements and testing for labeled rating.
  7. Facing: Wood veneer cut and species as specified shall conform to WDMA I.S. 1-A 2004 "A" grade for Premium Grade Door Construction requirements.
  8. Crossbands: Hardwood, 1/16 inches thick, extending full width of door.
  9. Edge Bands: Same species as face veneer, matched for color.
  10. Undercut doors only where required. See Sheet M-101.
- D. Wood Transom Panels:
1. Provide continuous sequence of veneer between transom panel and adjoining door using same width of veneer pieces on adjoining requirements for veneer quality and matching.
  2. Label doors and transoms to show door assembly match relationships specified.
- E. 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.

## 2.03 WOOD VENEER

- A. Face Veneer:
1. Shall meet quality standards conforming to WDMA I.S. 1-A 2004 "A" grade for transparent finish.
  2. Minimum face veneer thickness shall be 1/50" after finish sanding.
  3. Wood Species: Match existing
  4. Face Cut: Match existing
  5. Face Assembly: Match existing
  6. Face Symmetry: Match existing

## 2.04 VISION FRAMES

- A. Non-Rated Doors:
1. Flush bead wood frames, 1/2" thickness.
  2. Hardwood of same species as face veneer, matched for color.

- B. Fire Rated Doors:
  - 1. Provide UL rated frame. Match color of door face veneer.
  - 2. Equal to: "Air Louvers", "Slimline" lite kits with glazing.
  - 3. Factory glaze doors using compatible veneered metal lite kits.
- C. Glass:
  - 1. Refer to drawings for type and thickness.
  - 2. See Section 08800 - Glass and Glazing.

#### 2.05 FITTING AND FINISHING

- A. Fitting:
  - 1. Doors may be fitted for hardware at job site or pre-fitted and pre-machined at factory.
- B. Factory Finish:
  - 1. Generally, all doors shall be prefinished at the factory, unless indicated as field stained or a custom stain match is required.
  - 2. Selected finish color must be able to be matched.
  - 3. Transparent Finish shall match finish requirements indicated in AWI-"TR6".
  - 4. Comply with referenced AWI "Factory Finishing" for Premium Grade factory finish systems.
  - 5. Finish wood doors using three coats of water-clear, 100% solids, modified acrylic urethane, cured immediately with ultra-violet light. Factory seal all doors on all 6 sides.
- C. Coordination:
  - 1. Finish or stain doors before hanging.
  - 2. Variations in finish due to body oils on doors, planer marks or other irregularities not attributable to natural wood grain variations will be cause for rejection.

#### 2.06 ADHESIVES

- A. Adhesives:
  - 1. Face to core adhesives shall be Type I or Type II as appropriate for location in building.
  - 2. All adhesives must be classified Type I or Type II per WDMA TM-6 "Adhesive Bond Test Method."
  - 3. Use Type I adhesives for doors in exterior applications.
  - 4. Use Type II adhesives for doors in interior applications.

### PART 3 - EXECUTION

#### 3.01 INSPECTION

- A. Examine door frames and verify that frames are correct type and have been installed as required for proper hanging of corresponding doors. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb, square, and level jambs and heads.
- C. Modify existing wood doors to receive new door hardware, where applicable. Drill, Cut, patch, and sand smooth, modified areas. Modifications shall be seamless and not noticeable. Use touch up stain provided by custom stain manufacturer. Clear coat with Polyurethane after custom stain has dried.

#### 3.02 INSTALLATION

- A. Condition doors to average prevailing humidity in installation area prior to hanging. Install doors after building humidity is at an acceptable level.

- B. Handle doors in accordance with recommendations of WDMA I.S. 1-A, "Care and Installation at Job Site".
- C. Install wood doors in strict accordance with manufacturer's published instructions and as shown.
- D. Install accurately in frame. Install within the clearances specified in the manufacturer's written instructions. Install plumb, level, square and true.
- E. Install to operate freely, but not loosely, free from hinge and strike binding conditions. All doors shall be free from rattling when in the latched position.
- F. Pilot holes to be drilled for screws attaching hinges, locksets, and all other hardware to be installed on the doors. Pilot holes shall not exceed 90% of the diameter of the screw.
- G. Remove and replace all doors found to be warped, twisted, bowed, or otherwise damaged. Do not install doors which cannot be properly fitted to frames.
- H. Adjust pre-finished doors and hardware and other moving or operating parts to function smoothly and correctly.
- I. Ensure that smoke gaskets are in-place before pre-finished door installation.
- J. Bevel non-fire rated doors 1/8 inch in 2 inches lock and hinge edges.
- K. Fit to frames and machine for hardware to whatever extent not previously worked at factory as required for proper fit and uniform clearance at each edge.
- L. For non-rated doors provide the following clearances:
  - 1. 1/8 inch at jambs and heads.
  - 2. 1/2 inch at floor finish or covering.
- M. For installation of hardware, See Division 08710 - Finish Hardware.

3.03 ADJUST AND CLEAN

- A. Rehang or replace doors which do not swing or operate freely.
- B. Refinish or replace doors damaged during installation.
- C. Protect installed wood doors from damage or deterioration until Substantial Completion.
- D. Adjust doors for a smooth, balanced, fully functional opening.
- E. Clean pre-finished doors and hardware.

SUBMITTAL CHECKLIST

- 1. Manufacturer's Literature.
- 2. Shop Drawings.
- 3. Samples.
- 4. Warranty.
- 5. Certification.

END OF SECTION 08211

SECTION 08305 - ACCESS DOORS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Metal access doors as shown on the Drawings and specified herein, including:
1. Access doors in walls.
  2. Access doors in ceilings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 09900 - Painting  
Division 15 - Mechanical Access Panels  
Division 16 - Electrical Access Panels

1.03 QUALITY ASSURANCE

- A. Fire Resistive Ratings:
1. Where access doors are shown in rated assemblies, provide panel door, frame, hinge and latch from manufacturer listed by Underwriters Laboratories for ratings indicated.
- B. Use manufacturer's standard size units for nominal sizes indicated. Field coordinate actual unit sizes with rough openings and built-in anchors and inserts.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to job in manufacturer's unopened packages with labels intact.
- B. Store and handle produces so as to prevent damage. Remove all damaged items from the job site.

1.05 SUBMITTALS

- A. Product Data:
1. Manufacturer's published catalog information, product data sheets and cutsheets.
  2. UL fire rated test data stating achieved rating.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide products, as approved by the Architect, from one of the following acceptable manufacturers:
1. Babcock-Davis.
  2. Bilco.
  3. Dayton.
  4. J.L. Industries.
  5. Karp Associates, Inc.
  6. Milcor Incorporated.
  7. Vestal Manufacturing Co.

2.02 MATERIALS

- A. Access Doors:
1. Door: 14 gage steel.
  2. Frame: 16 gage steel with 1 inch flange.
  3. Hinge: Concealed spring type, 175 degree opening.
  4. Lock: Screwdriver activated cam lock.
  5. Finish: Gray baked enamel prime coat. Prepped for finish field coats.



6. Sizes: 20 inches x 40 inches minimum at attic access, unless otherwise indicated on Drawings.  
24 inches x 24 inches all other locations, unless otherwise indicated on Drawings.

B. Fire-Rated Access Doors:

1. Door: 20 gage steel, insulated sandwich panel construction.
2. Frame: 15 gage steel with 1 inch flange.
3. Hinge: Concealed pin type.
4. Lock: Recessed turn ring with interior latch release.
5. Closer: Spring type closer, adjust to assure positive latching.
6. Finish: Gray baked enamel prime coat. Prepped for finish field coats.
7. Sizes: 20 inches x 40 inches minimum at attic access, unless otherwise indicated on Drawings.  
24 inches x 24 inches all other locations, unless otherwise indicated on Drawings.
8. Label: 1-1/2 hour - "B" label, unless otherwise indicated on Drawings.

2.03 FABRICATION

- A. Fabricate units of continuous welded construction.
- B. Neatly fit all joints, and grind welds smooth and flush with adjacent surfaces.
- C. Furnish each access door as a complete unit with all parts ready for installation.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Field verify all rough opening dimensions.
- B. Assure that sufficient inserts, blocking and built-in anchors are provided for secure installation of doors.

3.02 INSTALLATION

- A. Install per manufacturer's recommendations.
- B. Painting of doors is specified in Section 09900.

3.03 ADJUSTING AND CLEANING

- A. Adjust hardware so that all doors operate smoothly and freely.
- B. Remove and replace panels or frames which are bowed, warped or damaged.

3.04 PROTECTION

- A. Protect doors from damage until Substantial Completion.

SUBMITTAL CHECKLIST

1. Product Data.

END OF SECTION 08305

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 08710 - Finish Hardware
- Section 08740 – Automatic Door Operator
- 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 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.
    - b. "EFCO", Series 402 (NT), Non-Thermal Storefront Framing.  
Provide at all locations interior to the building, including interior unit of vestibules, unless otherwise indicated.
  - 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.
  - 3. Automatic swing door system: See specification section-08740 Automatic Door Operator

2.02 MATERIALS

- A. Aluminum Extrusions:
  - 1. ASTM B 221.
  - 2. Alloy 6063-T5.
  - 3. Finish: Class 1 Anodic Coating with integral color, AA-M12-C22.  
Color to match existing.

- 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. 1/4 inch glass for all interior applications and all door units.
  - 3. See Section 08800 for glass specifications.
  - 4. See drawings for storefront, 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 interior and exterior vestibule 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 pivot 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 storefront, 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 storefront 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 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 building master keying systems in place as 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 08211 - Flush Wood Doors  
Section 08410 - Aluminum Entrances and Storefronts  
Section 08800 - Glass and Glazing  
Section 09900 - Painting  
Division 16: Electrical components, connections, and coordination

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. Must employ 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 to the latest A.D.A. requirements.

C. All work to comply to 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 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. Plainly mark packages or hardware so locations of use may be ascertained without breaking the 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:
  - Door Closers: Minimum Ten years.
  - Locksets: Minimum Five years.
  - Exit Devices: Minimum Five years.
  - All other hardware: Minimum One year.

PART 2 - PRODUCTS

2.01 KEYING AND KEYS

- A. 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 and Architect.
- B. Provide six (6) grandmaster keys, six (6) master keys per group, and two (2) keys per lock.
- C. Engrave all keys with the words **UNLAWFUL TO DUPLICATE THIS KEY**.

2.02 LOCKS AND LATCHES

- A. All cylinders must be factory keyed.  
Provide certification from lock manufacturer stating cylinders have been factory keyed.
- B. Cylinders to have removed cores.
- C. Provide construction cores as required.
- D. Hardware supplier must be an authorized stocking distributor of the lock they propose to furnish.

2.03 BUTTS AND HINGES

- A. Provide full mortise, ball bearing, template type hinges with flush barrel and non-removable pins.
- B. Exterior hinges to be of non-corrosive metals. Painted or galvanized steel not permitted.
- C. Except where label provisions require larger or heavier hinges or where specified otherwise herein:
  - 1. Provide 1-1/2 pairs of hinges for each door up to 7'-6".
  - 2. Provide 2 pairs of hinges for doors over 7'-6".
  - 3. Use 4-1/2" hinges on doors up to 3'-4" wide.
  - 4. Use 5" hinges on doors over 3'-4" wide.
- D. All hinges to be capable of 180 degree throw. Use wide throw hinges where necessary to clear jamb trim.

2.04 PLATES

- A. Provide stainless steel plates, where plates are noted. Screw-fasten solid to door.
- B. Kick Plates:
  - 1. 8" height, unless otherwise indicated.
  - 2. 2" less than the width of door, unless otherwise indicated.
- C. Armor Plates:
  - 1. 36" height, unless otherwise indicated.
  - 2. 1" less than the width of door, unless otherwise indicated.

2.05 SURFACE OVERHEAD CLOSERS

- A. In all cases, the manufacturer's recommended table of sizes is to govern the size of closers to be furnished.
- B. Use through-bolts to fasten surface closers to mineral core wood and hollow metal doors.

- C. Furnish special overhead closers where shown or specified.
- D. Provide parallel arms, corner brackets or drop plates as required.
- E. Provide 180° door swing where possible.
- F. Reduced force opening to comply with latest A.D.A. Standards for closers, regardless of type or location.

2.06 SINGLE POINT DOOR CLOSER WITH AND WITHOUT SMOKE DETECTOR

- A. In all cases, the manufacturer's recommended table of sizes is to govern the size of closures to be furnished.
- B. Use through-bolts to fasten surface closers to mineral core wood and hollow metal doors.
- C. Connect to electrical power source as specified in Division 16.
- D. See electrical.

2.07 STOPS

- A. Provide stops or bumpers wherever an opened door strikes any part of building construction, whether indicated or not. Generally, provide wall mounted stops for all doors.
- B. Furnish floor dome type where wall type cannot be used.
- C. Furnish heavy-duty floor stops at all exterior entry and panic doors, whether indicated or not.

2.08 SILENCERS

- A. Furnish door silencers for each single interior door and each pair of doors.
- B. Omit silencers at smoke doors and at sound proof or light proof doors.

2.09 FINISHES

- A. All finishes are to be 32D (field verify before ordering). Materials unable to have this finish applied are to have a finish to match.

2.10 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.
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”.
4. All hardware to be mounted per ADA.

C. Acceptable Manufacturers

<b>Hardware Item</b>	<b>Manufacturer</b>
Hinges:	Hager, McKinney, Stanley, Bommer
Locksets/Deadbolts/Cylinders:	Best, Schlage, Sargent, Yale, Dorma, Falcon
Panic Devices:	Von Duprin, Precision, Falcon
Push/Pulls:	Hager, Rockwood, Trimco
Closers:	LCN
Wall/Floor Stops:	Hager, Rockwood, Trimco, Glynn-Johnson
Overhead Stops/holders:	Hager, Rockwood, Trimco, Glynn-Johnson
Wall/Floor Holders:	Hager, Rockwood, Trimco, Glynn-Johnson
Thresholds:	Hager, NGP, Pemko, Reese
Seals/Sweeps/Gaskets/Bottoms:	Hager, NGP, Pemko, Reese
Plates:	Hager, Rockwood, Trimco, Ives
Silencers:	Hager, Rockwood, Trimco, Ives
Astragals:	ASSA Abloy

D. Hinges:

1. All interior hinges shall be Hager, BB1168.
2. All exterior pivots shall be aluminum entrance manufacturers standard top and bottom offset pivots to match existing.

E. Locksets (Mortise): BEST or SARGENT

1. All locksets shall be Best, H Series, 45H heavy-duty mortise locks.
2. All locksets shall have "16" lever and "H" rose.
3. Provide integral deadbolt where deadbolts are identified.
4. All meeting rooms shall be equipped with anti-intruder capabilities that enable the doors to be locked from the inside of the room while still allowing egress from the inside without the use of a key.  
Rotating the inside lever shall retract both the deadbolt and latch simultaneously.
5. Deadbolts from public rooms, such as restrooms and meeting rooms, shall be equipped with anti-throw capabilities such that the latch cannot be thrown from the interior side of the room. In all conditions, operation from the inside shall allow the locked deadbolt to automatically unlatch when the lockset lever is operated during egress without the use of a key.
6. All other conditions, function and operation as selected by Owner from all manufacturer's available.

- F. Panic Devices:
1. All panics shall be Von Duprin, 99 Series. (Except for aluminum entrance doors and these shall be aluminum entrance manufacturers standard).
  2. Provide XP 99 option for two-piece latch bolt at all exterior entry door locations, unless noted specifically to not provide them. The tapered section of the latch bolt recedes and the remaining section forms a 90 degree angle to the strike pad, making the latch more secure to entry.
  3. Provide "#06" lever trim on all devices, unless indicated otherwise.
  4. Provide cylinders for all panic devices to be compatible for brand of locksets provided.
  5. Provide Cylinder Dogging on all devices.
  6. Provide vertical rod and latch guards for all surface-mounted vertical rod devices.
  7. Provide fire rated devices for all rated doors assemblies.
  8. Exterior panic doors to have universal latch function, adjustable in the field for operation as desired.
  9. All other conditions, function and operation as selected by Owner from all manufacturer's available.
  10. Strikes to have roller.
  11. Latch bolts to have deadlatching.
- G. Push/Pulls:
1. Aluminum entrance door manufacturers standard.
- H. Surface Closers:
1. Push side condition: shall be LCN, 4110 Series (reduced force ADA cylinder), parallel arm.
  2. Pull side condition: shall be LCN, 4010 Series (reduced force ADA cylinder), non-parallel arm.
  3. Mounting shall be on the inside face of the door, interior to the room.
  4. All covers shall be metal.
  5. All finishes shall be powder coat aluminum.
  6. Provide hold open functions where specified. All hold opens to be adjustable set up to 180 degrees.
  7. Provide concealed closer in lieu of surface closer where a closer is used in conjunction with overhead stops/holders.
- I. Concealed Closers:
1. All concealed closers shall be LCN, 2030 Series (reduced force ADA cylinder), concealed arm.
  2. Unit shall be concealed in tube within head of door frame. Arm shall be concealed within door.
  3. All finishes shall be powder coat aluminum.
  4. Provide hold open functions where specified. All hold opens to be adjustable set up to 180 degrees.
  5. Provide concealed closer in lieu of surface closer where a closer is used in conjunction with overhead stops/holders.
- J. Stops:
1. All wall stops shall be Hager, 236W.
  2. All floor stops shall be Hager, 241F; 243F if high stop condition is required.
  3. All heavy-duty floor stops shall be Hager, 269F.
  4. Wall stop with holder shall be Hager, 256W.
  5. Floor stop with holder shall be Hager, 268F.
- K. Overhead Stops/holders:
1. All overhead stops shall be Glynn-Johnson, 90 Series.
  2. Set units for combination of stop and hold open functions.
  3. Coordinate installation with closers for proper operation and performance.
  4. Provide concealed closer in lieu of surface closer where a closer is used in conjunction with overhead stops/holders.

- L. Thresholds:
1. Aluminum, saddle-type.
  2. Fully ADA compliant, 1/4" maximum height.
  3. Span entire width and depth of opening.
- M. Seals/Sweeps/Gaskets/Bottoms (used for Weatherstripping):
1. Vinyl, Neoprene, EPDM, TPE (thermoplastic elastomer), or silicone.
  2. Full length and width of opening at each condition.
  3. Provide weatherstripping seal sets at entire perimeter jambs and head of all exterior doors, whether scheduled or not.
  4. 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.
  5. Provide bottoms on all exterior doors, whether scheduled or not.
  6. All bottoms shall be Hager, 772S, mil finish aluminum.
- N. Plates:
1. All kick plates shall be Hager, 220S; height=10", length=2" less than door.
  2. All armor plates shall be Hager, 220S; height=36", length=1" less than door.
  3. All plates to have countersunk screws.
  4. Provide kick plates on the interior side of all doors in a restroom, custodial or janitorial room, mechanical or electrical room, laundry room or other such utility space, whether scheduled or not.
  5. Provide armor plates on both sides of all crash or impact doors, whether scheduled or not.
- O. Electromagnetic Door Holders:
1. Specified under Section 13850 – Fire Detection and Alarm System.
- P. Split Astragals: 1 pair equals: 4 each 310 bars and 2 each 311 cin cloth inserted rubber pieces
1. Split astragals shall be ASSA Abloy PEMKO 311 cin split astragal. (One (1) pair per door system)  
Finish: Black  
311 Cin: Cloth Inserted Neoprene.

## 2.11 HARDWARE SCHEDULE

### **Hardware Set #1 – Pairs 101a and 118a**

- Remove existing entrance doors and thresholds and hardware (both leafs)
- Automatic door operator, see spec section 08740 (both leafs)
- Automatic door operation shall be provided with an adjustable timing system to allow opening delay between exterior and interior vestibule door systems (See Specifications)
- New handicapped aluminum entrance threshold, manufacturers standard (both leafs)
- Aluminum entrance manufacturer standard  
Pivots to match existing (both leafs)
- Aluminum door manufacturers standard panic device (both leafs)
- Stops (both leafs)
- Weatherstripping (both leafs)
- Handicap button for power door opener with manufacturer's standard support pole (see specifications (exterior locations).
- Power supply for door operators.

**Hardware Set #2 – Pairs 101b and 118b**

- Remove existing entrance doors and hardware (both leafs)
- Automatic door operator, see spec section 08740 (both leafs)
- Automatic door operations shall be provided within an adjustable timing system to allow opening delay between exterior and interior vestibule door systems (see specifications)
- No threshold required
- Aluminum entrance manufacturer standard  
Pivots to match existing (both leafs)
- Aluminum entrance manufacturers standard push plates (both leaves)
- Aluminum entrance manufacturers standard pull plates (both leafs)
- Stops (both leafs)
- Weatherstripping (both leafs)
- Handicap button for power door opener (interior locations).
- Power supply for door operators.

**Hardware Set #3 – 105, 107, 110, 113, 114,115, 121b, 122, 123, 124, 125, 126**

Rated Hardware

- Hinges
- Closers
- Lockset (mortise)
- Seals/gaskets (fire and smoke seals); except at door #110.
- Kick plate
- Stop
- Silencers
- Door No. 113 shall be provided with a magnetic hold open device. (Connect to existing Fire Alarm System).
- Power supply for magnetic hold open device and smoke detector for door 113.

**Hardware Set #4 – 109, 121a**

Non - Rated Hardware

- Hinges
- Lockset (mortise)
- Kick plate
- Stop
- Silencers
- 

**Hardware Set #5 – Pair 128a**

Non - Rated Hardware

- Hinges (both leafs)
- Closers with hold open devices (both leafs)
- Panic hardware (both leafs)
- Stops (both leafs)
- Kick plates (both leafs)

**Hardware Set #6 – pairs: 129a and 130c**

Rated Hardware

- Hinges (both leafs)
- Closers (both leafs)
- Panic hardware (both leafs)
- Stops (both leafs)
- Seals/gaskets (fire and smoke seals) (both leafs)
- Kick plate (both leafs)
- Magnetic hold open device (both leafs) (Connect to existing Fire Alarm System)
- Power supply for magnetic hold open devices and smoke detector (both leafs)
- “Split” astragals (both leafs)

**Hardware Set #7 – 128b**

- Aluminum entrance manufacturers standard pair of pivots
- Handicapped threshold
- Aluminum door manufacturers standard panic device
- Weatherstripping
- Stop
- Closer

**Hardware Set #8 – 129b, 130a, 130b**

- Door hardware supplied by the operable partition manufacturer

**Hardware Set #9 – 102, 103, 119, 120**

- New lockset (mortise) privacy function w/exterior deadbolt
- Remove hardware locksets to accommodate new locksets
- Provide additional trim to conceal holes where existing hardware was removed.

**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 08740 - AUTOMATIC DOOR OPERATOR

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Furnish labor, materials, equipment, special tools, supervision and services required to install automatic entrance equipment as indicated on drawings and as specified herein.

1.02 RELATED WORK ELSEWHERE:

- Section 08110 - Steel Doors and Frames  
Section 08211 - Flush Wood Doors  
Section 08410 - Aluminum Entrance and Store Fronts  
Division 16 - Electrical

1.03 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies.  
1. Underwriters Laboratory, Inc. (UL).  
2. Federal Regulation ANSI 117.  
3. All automatic equipment to comply with ANSI A156. 10.

1.04 SUBMITTALS

- A. Shop drawings showing complete elevations, details and method of anchorage to location; installation of hardware; size, shape and thickness of materials; joints and connections; and details of joining with other construction.

1.05 WARRANTY

- A. Warranty of power operators, controls and labor provided by automatic door equipment installer against defects in material and workmanship at no cost to owner, for a period of one year from date of substantial completion.

PART 2 - PRODUCTS

2.01 AUTOMATIC SWING DOOR SYSTEM

- A. Automatic door operator shall be heavy duty/low energy/ADA "System GT 500" /8500 as manufactured by NABCO Gyro-Tech, Inc. or equivalent.
- B. Mode of Operation:
1. Spring Close. Operator shall open door by energizing motor and shall stop door by stalling motor against mechanical stop. Door shall close slowly by means of spring energy, closing force shall be controlled by gear system and motor being used as dynamic brake without power. Complete automatic door cycle 18 to 20 seconds.
  2. Manual door operation shall require less than 12 lbs. of force applied to door stile. System shall also operate as a manual door in event of power failure.
  3. Hold open time between pairs of doors shall be adjustable. Door operation shall not require any fluids or gases under pressure to be used in opening and closing of door.
  4. Operator shall activate both leafs at pairs of doors.
- C. Operator Housing:
1. Aluminum extrusions with finished end caps and shall be prepared for mounting to new door frames. All structural sections shall have a minimum thickness of 0.146@ (3.7 mm) and shall be fabricated of 6063-T5 aluminum alloy.
  2. Finish shall match door.
  3. Housing shall extend across full opening width at pairs of doors.

- D. Power Operator:  
Completely assembled and sealed unit which shall include helical gear-driven transmission, overriding clutch (to provide easy manual operation, spring-close), mechanical spring and bearings, all located in cast aluminum housing and filled with special lubricant for extreme temperature conditions. Attached to a transmission system shall be a DC shuntwound permanent magnet motor with sealed ball bearings. Motor shall operate from 115-volt supply and require less than 5 amps at full power stall. Complete unit shall be resilient mounted with provisions for easy replacement, without removing door from pivot or frame.
  
- E. Electrical Control:
  - 1. Self-contained unit including necessary transformer, relays, rectifiers, and other electronic components for proper operation and switching power operator.
  - 2. Relays shall be plug-in type for individual replacement. All connecting harnesses shall have interlocking plugs.
  - 3. Controls shall also include time delay for normal cycle. Control shall also include adjustable (0-60 second) time delay module.
  
- F. Connecting Hardware:  
Connect conversion unit (CU) drive arm to inswing door with a urethane covered roller, which shall ride in a track fabricated of 6061-T6 aluminum alloy attached to the top door rail where required for pull-type operation. Outswing doors shall be connected to operator by a two-piece drive arm with self-aligning rod ends and connecting door bracket for push-type operation.

2.03 ACTIVATING DEVICES

- A. Wall Mounted Switches:  
6" or manufacturer's standard diameter stainless steel, flush wall mounted device, ADA accessible, engraved with the international symbol of accessibility and "push to open" text. See plan for location.
- B. Pole Mounted Switches:  
6" or manufacturer's standard diameter stainless steel, mounted device on manufacturers standard ADA accessible pole system, including foundation system engraved with the International symbol of Accessibility and "push to open" text. See plan for location.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Automatic door equipment shall be installed in compliance with manufacturer=s recommendations and approved shop drawings.

3.02 CLEANING AND PROTECTION

- A. After installation, clean framing members as recommended by manufacturer. Aluminum surfaces in contact with masonry, concrete and steel shall be protected from contact by use of neoprene gaskets where indicated, or a coat of bituminous paint to prevent galvanic or corrosive action. Protect unit from damage during subsequent construction activities.

END OF SECTION 08740

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 08110 - Steel Doors and Frames  
Section 08211 - Flush Wood Doors  
Section 08410 - Aluminum Entrances and Storefronts

1.03 QUALITY ASSURANCE

- A. Comply with the following:
1. Glazing Material:
    - a. ANSI Z97.1.
    - b. ASTM 1036, Standard Specifications for Flat Glass.
  2. Safety Glazing:
    - a. Federal Standard CPSC 16 CFR 1201.
    - b. ANSI Z97.1.
    - c. ANSI Z97.1q.
    - d. U.S. Consumer Product Safety Commission Standard 16 CFR 1201 CI and CII.
    - e. ASTM C1172, Standard Specification for Laminated Architectural Flat Glass.
  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.
- C. The level of acceptability for glass and glazing products may be more strict than the basic standards referenced herein. The Owner and/or Architect reserve the right to determine whether a product is acceptable for its intended use, in its intended application, for its intended clarity of visibility, and as required for its intended aesthetic effect.

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:
  1. 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. Provide products, as approved by the Architect, from one of the following, or as otherwise specifically listed:
1. "AGC Glass Company North America".
  2. "Guardian Industries".
  3. "Oldcastle Building Envelope".
  4. "Pilkington North America, Inc.".
  5. Vitro/"PPG Industries, Inc.".
  6. "Firelite Glass"

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 match existing.
- 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. "AGC"; Energy Select 36.
    - b. "Guardian", SunGuard SuperNeutral 68.
    - c. "PPG", Solarban 60.

- D. 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.
  
- E. Fire-Resistant and Impact 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.
  
- 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 float glass
    - b. Provide tempered safety glass where required on drawings.
    - c. All requirements of Low-E glass apply as specified above.
    - d. See Tinted Float Glass for tint color.
  - 4. Indoor Lite:
    - a. 1/4" clear float glass,
    - b. Provide tempered safety glass where required on drawings.
    - c. All requirements of laminated or tempered safety glass apply as specified above.
  - 5. Separate outdoor and indoor lites by 1/2" desiccant spacer bar.

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 are defective or damaged in any way.
- 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 any glass which has become broken, cracked, chipped, or damaged, in any way and from any source, including weather, vandalism, construction, handling, accidents during the construction period, etc.
- 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 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. Non-load bearing interior partition steel stud construction as shown on Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- Section 06100 - Rough Carpentry
- Section 07200 - Insulation
- Section 08110 - Steel Doors and Frames
- Section 09900 - Painting

1.03 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. "Certainteed"; 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.

- B. Gypsum Board (Tile Backer Board):
  - 1. Provide one of the following approved products:
    - a. "Georgia-Pacific"; Dens-Shield Tile Backer.
    - b. "National Gypsum Company / Gold Bond"; eXP Tile Backer.
  - 2. Manufacture to meet specifications for ASTM C 1178.
  - 3. Provide in maximum lengths available to minimize end-to-end butt joints.
  - 4. Thickness: 5/8 inch, as indicated on the Drawings.
  - 5. Width: 4 feet.
  - 6. Length: 8 feet minimum.
  - 7. Edges: Square.
  - 8. Provide at all areas where wall tile is scheduled. See Drawings.

## 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. Non-Load Bearing Screw Type Steel Studs:
  - 1. Manufacturer's standard formed light gauge steel studs of the height, size, and gauge indicated, with punched webs to facilitate erection of system and passage of mechanical/electrical service lines. Lateral loading shall have a minimum of 5 lbs. per sq. ft.
  - 2. Steel stud framing at interior partitions:
    - a. Gauge: minimum 20 gauge and 30 mils thickness, ASTM C645.
    - b. Depth of Section: 3-5/8 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.
    - g. Use 1-1/2 inches cold rolled channel at 48 inches o.c. horizontally above interior ceiling.
    - h. Floor and Ceiling Tracks: Cold formed channel shape, galvanized, width as required to receive studs, and flange/leg size not less than 1.25 inches.
    - i. Double 20 gauge studs at all door and window jambs.
    - j. Provide "Shaft Wall Type" 4" C-H shaped studs, 1-1/2" wide where required at 1 hour and 2 hour rated wall systems.

- D. 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.
  - 5. UL approved for use in fire rated assemblies, where applicable.
  
- E. Flexible Steel Stud Runners and Tracks:
  - 1. Equal to: "Flex-Ability Concepts", "FLEX-C TRAC".
  - 2. Galvanized steel sheet track.
  - 3. Zinc-coated steel side bands.
  
- F. Furring Channels or Strips:
  - 1. 7/8" or 1-1/2", as indicated on Drawings. If not indicated, provide 1-1/2".
  - 2. 20 gauge, minimum.
  - 3. Cee shape or Hat Channel profile.

### 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.
  
- B. Accessories:
  - 1. Corner reinforcements, casing beads and metal trim, fabricated from 26 gauge galvanized sheet steel with perforated flanges, designed to receive joint compound.
  
- C. Control Joints:
  - 1. "USG", "No. 093".
  
- D. Suspension System for Suspended Gypsum Board Ceiling:
  - 1. "USG/Donn", "Rigid X".
  
- E. Hangar Wires:
  - 1. ASTM A-641, 12 gauge, 0.475 lbs/ft.
  
- F. Drywall Reveals and Moldings:
  - 1. "Gordon, Inc.", Fry Reglet Architectural Metals.
  - 2. Sizes and shapes as shown on Drawings, or if not shown, 1/2 inch wide reveal.
  - 3. Extruded aluminum.

## PART 3 - EXECUTION

### 3.01 INSTALLATION OF WALLBOARD

- A. Single Layer Wallboard - Metal Stud Partitions:
  - 1. Secure metal runners to concrete slabs with power driven anchors, space 24 inches o.c.
  - 2. Space metal studs 16 inches o.c. and locate studs at door and window frames, partition intersections and corners. Locate studs within 2 inches of all door-frame jambs and anchor to jamb and head anchor clips of frame by screw attachment. Over frames a cut-to-length stud extending from door frame header to ceiling runner shall be positioned over vertical joints over door frame. Anchor all frames at jamb anchor clips, after stud and before gypsum wallboard is installed.
  - 3. Sound attenuation blankets shall be pressure-fit between studs.
  - 4. Apply single layer wallboard face out with long dimension vertical. All abutting ends and edges shall occur over stud on different studs. Screws shall be spaced 12 inches o.c. in field of board and 8 inches o.c. staggered along vertical edges.
  - 5. Use wallboard of maximum practical lengths to minimize end joints.

6. Use single panel to span entire length of width of surface where possible.
  7. Stagger end joints when they occur.
  8. Locate end joints as far as possible from center of wall or ceiling.
  9. Butt wallboards without forcing
  10. Support ends and edges of wallboard panels on framing or furring members.
- B. Wall Board Ceilings - Suspended:
1. Install suspension system level and true, in accordance with manufacturer's instructions, to a tolerance of 1/8 inches in 12'-0".
  2. Install suspension system to comply with ASTM C636. Secure only from building structural members. Locate hangers near each end and at 4'-0" along each carrying channel.
  3. Install fastener type and spacing per manufacturer or corrosion resistant buglehead drywall screws at 12 inches o.c. in field and 8 inches o.c. along edges; whichever is the most restrictive requirement.
- C. Accessories:
1. Corner beads shall be installed on all exterior corners attached with suitable fasteners spaced 9 inches o.c. on both sides, and shall be in single lengths unless corner exceeds standard stock lengths.
  2. Metal trim shall be installed over face-layer wallboard, attached with suitable fasteners spaced 9 inches o.c. and shall be in single lengths unless application length exceed standard stock lengths.
  3. Wallboard screws shall be applied with an electric driver.
  4. Provide control joints at maximum 28'-0" o.c. If additional shrinkage cracks occur, install control joints and patch cracks.
- D. Joint Treatment:
1. Finish all joints and interior corners with joint tape and joint compound.
    - a. Apply joint compound sufficiently thick to hide board surface at angles and joints. Cover nail/screw heads and depressions with compound.
    - b. Apply tape, squeeze out excess compound and cover tape with compound.
    - c. When first coat has thoroughly dried apply two coats of compound, extending each coat slightly beyond previous coat. Sand to smooth, flat surface, ready for specified finish.
- E. Finish:
1. Level 5 finish at all exposed areas.
  2. If specifically permitted by the Architect, provide Level 4 finish at all exposed areas and Level 5 finish at the following conditions:
    - a. All walls indicated to receive a skim coating.
    - b. All walls scheduled to receive a highly reflective wallcovering.
    - c. All wall areas scheduled to receive a dryerase or projectable wallcovering.
    - d. All wall areas scheduled to receive a dryerase paint or chalkboard paint.
    - e. All surfaces of all drywall which is paperless, fiberglass mats, or otherwise textured.
  3. Level 2 finish at concealed areas (above ceilings, draftstopping).
  4. No textured walls or ceilings.

### 3.02 CLEANING

- A. Remove soil, stain caused by drywall installation.

### SUBMITTAL CHECKLIST

1. Product Data.

END OF SECTION 09250

SECTION 09300 - TILE

PART 1 - GENERAL

1.01 SUMMARY

- A. Related Documents: General and Supplementary Conditions of the Contract, Division 1 General Requirements, and Drawings are applicable to this Section.
  
- B. Section Includes:
  - 1. Glazed porcelain floor tile and base where shown on Drawings.
  - 2. Glazed ceramic wall tile where shown on Drawings.

1.02 SUBMITTALS

- A. Shop Drawings:
  - 1. Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control joints, thresholds, and setting details.
  - 2. Locate and detail expansion and control joints.
  
- B. Product Data:
  - 1. Manufacturer's product data sheets, cutsheets, specifications and instructions for using mortars, adhesives, and grouts.
  
- C. Samples:
  - 1. Tile: Submit color samples as specified on Drawings or manufacturer's entire color selection.
  - 2. Grout: Submit color samples as specified on Drawings or manufacturer's entire color selection.

1.03 QUALITY ASSURANCE

- A. Single Source Responsibility:
  - 1. Obtain each type and color tile material required from single source.
  - 2. Obtain setting and grouting materials from one manufacturer to ensure compatibility.
  - 3. Furnish a 10 year guarantee from installation material manufacturer. The guarantee is inclusive of installation materials, finish product, and labor.
  
- B. Manufacturer Qualifications:
  - 1. Tile: Minimum 5 years experience in manufacture of tile products.
  - 2. Setting Materials:  
Minimum 10 years experience in manufacture of setting and grout materials specified.
  - 3. Membrane: Minimum 5 years experience in manufacture of membrane materials specified.
  
- C. Installer Qualifications:
  - 1. Specializing in tile work having minimum of 5 years successful documented experience with work comparable to that required for this Project.
  
- D. Certifications:
  - 1. Submit "Master Grade Certificate" for each type of ceramic, quarry, and paver tile in accordance with requirements of ANSI A137.1.
  - 2. Submit manufacturer's certifications that mortars, adhesives, and grouts are suitable for intended and specified use.
  
- E. Conform to ANSI- Recommended Standard Specifications for Ceramic Tile - A137.1.
  
- F. Conform to TCA Ceramic Tile: The Installation Handbook.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Section 01610.
- B. Labeling: Comply with ANSI A137.1.
- C. Deliver materials in manufacturer's unopened containers, fully identified with name, brand, type, and grade.
- D. Protect materials from contamination, dampness, freezing, or overheating in accordance with manufacturer's instructions.
- E. Broken, cracked, chipped, stained, or damaged tile will be rejected, whether built-in or not.
- F. Protect mortar and grout materials against moisture, soiling, or staining.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Comply with requirements of referenced standards and recommendations of material manufacturers for environmental conditions before, during, and after installation.
- B. Do not begin installation until building is completely enclosed and HVAC system is operating and maintaining temperature and humidity conditions consistent with "after occupancy" conditions for a minimum of 2 weeks.
- C. Maintain continuous and uniform building temperatures of not less than 50 degrees F during installation nor more than 100 degrees F.
- D. Ventilate spaces receiving tile in accordance with material manufacturers' instructions.

1.06 MAINTENANCE MATERIALS AND DATA

- A. See Specification Section 01781 - Closeout Maintenance Materials.
- B. Submit maintenance data under provisions of Section 01780 - Closeout Submittals.
- C. Include cleaning and maintenance methods, cleaning solutions recommended, stain removal methods, and polishes and waxes recommended.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. "Emser Tile".
- B. "Crossville".

2.02 GENERAL

- A. ANSI Standards:
  - 1. Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for types, compositions, and grades of tile indicated.
  - 2. Furnish tile complying with "Standard Grade" requirements unless otherwise indicated.

- B. ANSI Standard for Tile Installation Materials:
  - 1. Comply with ANSI standard referenced with products and materials indicated for setting and grouting.
- C. Factory Blending:
  - 1. For tile exhibiting color variations within the ranges selected during sample submittals, blend tile in factory and package accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.
- D. Mounting:
  - 1. Where factory-mounted tile is required, provide back-face or edge-mounted tile assemblies as standard with manufacturer unless another mounting method is indicated.
  - 2. Where tile is indicated for installation in swimming pools, on exteriors or in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies that this type of mounting is suitable for these kinds of uses and has been successfully used on other projects.

### 2.03 PORCELAIN TILE

- A. Glazed Porcelain Floor Tile:
  - 1. Type: As shown on Drawings.
  - 2. Size: As shown on Drawings.
  - 3. Pattern: As shown on Drawings.
  - 4. Color: As shown on Drawings.
- B. Glazed Porcelain Tile Base:
  - 1. Type: As shown on Drawings.
  - 2. Size: As shown on Drawings.
  - 3. Pattern: As shown on Drawings.
  - 4. Color: As shown on Drawings.

### 2.04 CERAMIC TILE

- A. Glazed Ceramic Wall Tile:
  - 1. Type: As shown on Drawings.
  - 2. Size: As shown on Drawings.
  - 3. Pattern: As shown on Drawings.
  - 4. Color: As shown on Drawings.

### 2.05 THRESHOLDS

- A. Metal Edge Strip:
  - 1. General:
    - a. Provide metal edge strip at the transition between the tile flooring to the adjacent flooring.
    - b. Equal to : “Schluter Systems” transition and edge strips.
  - 2. Size and Profile:
    - a. Bent angle profile with smooth finished edges.
    - b. Configuration as required to provide proper transition between finished surface of tile and that of the adjacent finished flooring.
    - c. Height to match the thickness of the tile, with top surface smooth and flush with the tile.
  - 3. Finish:
    - a. White zinc, aluminum or stainless steel.
    - b. Finish as selected from all manufacturer’s standard selection.

### 2.06 TRIMMERS

- A. Provide necessary caps, stops, returns, trimmers and other shapes to complete installation.



2.07 MORTAR MATERIALS - THIN SET BEDS

- A. Portland Cement With Latex Additive; Thin-Set:
  - 1. Provide one of the following acceptable products:
    - a. "Custom Building Products", CustomCrete Latex Mortar Admix with site mixed Mortar or CreteMix.
    - b. "Laticrete, 4237 Latex Thin Set Mortar Additive.
    - c. "Mapei, Keracrete System, consisting of KER 303 Latex mixed with 1:1 sand/cement blend.
  - 2. Description:
    - a. Latex additive and site mixed portland cement mortar. Complying with ANSI A118.4.
  - 3. Quantity:
    - a. As recommended by latex additive manufacturer.
- B. Lightweight Portland Cement; Thin-Set (for use with 12" x 24" floor tile):
  - 1. Provide one of the following acceptable products:
    - a. "Custom Building Products", ProLite Tile & Stone Mortar or approved equal.
  - 2. Description:
    - a. Lightweight formula for use with large format tile and stone.
    - b. Complying with ANSI A118.4TE, A118.15TE and A118.11.

2.08 MEMBRANES, PRIMERS AND SEALERS

- A. Crack Isolation and Waterproofing Membrane:
  - 1. Provide one of the following acceptable products:
    - a. "Mapei", Mapelastic 315.
    - b. "Custom Building Products", Red Gard.
  - 2. Description:
    - a. Trowel applied elastomeric compound.
  - 3. Accessories:
    - a. Preformed fiberglass mesh coving, inside and outside corners, and drain fittings.
    - b. Preformed expansion joint flashing.
- B. Concrete Slab Primers and Sealers:
  - 1. Where existing substrate is unacceptable for adhesion or bonding of new materials: Provide primers and sealers as required by flooring manufacturer to achieve the proper substrate conditions for installation of flooring.
  - 2. Scarify, shot-blast, or sand-blast floor as required at no change in bid price.

2.09 GROUT

- A. Polymer- Modified Portland Cement
  - 1. Provide one of the following acceptable products:
    - a. "Custom Building Products", Prism Color Consistent Grout.
  - 2. A lightweight, polymer-modified, cement-based grout that offers consistent color without mottling or shading. Composition is a blend of specialty cements, recycled aggregates and chemicals.
  - 3. Comply with ANSI A118.7
  - 4. Color: As indicated or to be selected by Architect from manufacturer's entire selection.
  - 5. Location: Provide for all floor and wall surfaces, unless indicated otherwise. Non-sanded grout must be used with glass tile and glazed ceramic wall tile.

2.10 GROUT SEALER:

A. Sealer:

1. Provide one of the following acceptable products:
  - a. "Custom Building Products", Tile Lab Surfacegard Penetrating Sealer.
  
2. Description:
  - a. Water-based, clear.
  - b. Compatible with surfaces comprised of marble, stone, porcelain, ceramic, quarry, grout, concrete, brick, masonry and unglazed tile.
  - c. Compatible with tile manufacturer's warranty requirements.
  - d. Repel dirt, oils and stains. Resists mold and mildew.
  - e. Low odor, pH neutral and non-abrasive.
  - f. Allow moisture vapor transmission.
  - g. Rated for interior and exterior use.

B. Stripper:

1. Provide one of the following acceptable products:
  - a. "Custom Building Products", Tile Lab Heavy-Duty Cleaner and Stripper.
2. To clean surfaces and strip wax and acrylic finishes.
3. Apply to all surfaces in strict accordance with the manufacturer's instructions.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that areas to receive tile installed by thin bed method have wood float finish and pitched to drains. Substrates are to be true within 1/8 inch in 10'-0" (for all tiles 18" and larger). Substrates are to be true within 1/4 inch in 10'-0" (for all tiles smaller than 18").
  
- B. Condition of Surfaces to Receive Tile:
  1. Firm, dry, clean and free of oily or waxy films, mortar and soil.
  2. Grounds, anchors, plugs, hangers, bucks, electrical and mechanical work in or behind tile installed.
  
- C. Air Temperature and Surfaces in Rooms to Receive Flooring:
  1. Between 60 degrees to 90 degrees F, unless otherwise recommended by manufacturers of materials being installed.

3.02 PREPARATION

- A. Clean substrates.
  
- B. Wet down or wash dry, dusty surfaces and remove excess water immediately prior to application of tiles.
  
- C. Prepare surfaces in strict accordance with instructions of manufacturer whose setting materials or additives are being used.
  
- D. Acid Based Cleaners: Use not permitted.
  
- E. Scarify concrete substrates with blast track equipment if necessary to completely remove curing compounds or other substances that would interfere with proper bond of setting materials. Clean and maintain substrate in condition required by setting material manufacturer.
  
- F. Do not seal substrate unless required by manufacturer.

- G. Prime substrate when required by manufacturer.
- H. Blending:
  - 1. For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.
  - 2. If not factory blended, either return to manufacturer or blend tiles at project site before installing.

### 3.03 INSTALLATION

- A. Concrete Slab Primers and Sealers:
  - 1. Install primers and sealers in accordance with manufacturers recommended installation guidelines and details.
  - 2. Apply all concrete slab primers and sealers as required to achieve an acceptable substrate for installation of flooring per flooring manufacturer's requirements. Apply when areas are ready or scheduled to receive flooring without delays to the project or schedule, and without any additional costs or change in time. If floor is required to be sandblasted, shot-blasted, scarified, or otherwise prepared, perform this work at no additional cost or change in time.
- B. Crack Isolation and Waterproofing Membrane:
  - 1. Install membrane in accordance with manufacturers recommended installation guidelines and details.
  - 2. Install membrane over cracks of up to 1/8 inch or greater in substrates. Apply a 12 inch wide strip centered on crack as crack isolation membrane.
  - 3. Install membrane with products or methods approved in writing by membrane manufacturer when joining, sealing, fastening, or adhering sheet membranes.
  - 4. Once all cracks have been addressed, install membrane to entire floor substrate as waterproofing membrane.
  - 5. Flash waterproofing up adjacent walls and surfaces in accordance to manufacturer's details, full height of base.
  - 6. Use preformed cove, corners, and expansion joint flashing.
  - 7. Allow membrane to cure as prior to setting tile.
  - 8. Do not allow construction traffic on membrane.
  - 9. Flood test waterproof membranes after fully cured.
  - 10. Field Quality Control water test when required.
- C. Tile Installation, General:
  - 1. Install tile materials in accordance with ANSI A137.1, other referenced ANSI and TCNA specifications, and TCNA "Handbook for Ceramic Tile Installation", except for more stringent requirements of manufacturer or these Specifications.
  - 2. Cut and fit tile tight to protrusions and vertical interruptions and treat with a compatible sealants as required. Form corners and bases neatly.
  - 3. Work tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joint watertight, without voids, cracks, excess mortar, or grout.
  - 4. Prepare surface, fit, set, bond, grout and clean in accordance with applicable requirements of ANSI standards and Tile Council of North America.

- D. Layout:
1. Lay out work to pattern indicated so that full tile or joint is centered on each wall and no tile of less than half width need be used. Do not interrupt pattern through openings. Lay out tile to minimize cutting and to avoid tile less than half size.
  2. For heights stated in feet and inches, use courses of full tile to produce nearest attainable heights without cutting tile.
  3. No staggered joints will be permitted.
  4. Align joints in tile in both directions.
  5. Align joints between floor and base tile.
  6. Make joints between sheets of tile exactly same width as joints within sheet.
  7. File edges of cut tile smooth and even.
  8. Cut and fit tile at penetrations through tile. Do not damage visible surfaces. Carefully grind edges of tile abutting built-in items. Fit tile at outlets, piping and other penetrations so that plates, collars, or covers overlap tile.
  9. Extend tile work into recesses and under or behind equipment and fixtures, to form complete covering without interruptions, except as otherwise indicated. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignments.
  10. Accurately form intersections and returns.
- E. Thin Set Method, Floors and Walls, ANSI-108.4, 108.5, 108.14, 108.15, 108.16:
1. Apply mortar or adhesive with notched trowel using scraping motion to work material into good contact with surface to be covered. Maintain 90 percent coverage on back of tile and fully bed all corners.
  2. Apply only as much mortar or adhesive as can be covered within allowable windows as recommended by mortar or adhesive manufacturer or while surface is still tacky.
  3. When installing large tiles, ceramics or mosaics, trowel small quantity of mortar or adhesive onto back of each tile or sheet of tiles.
  4. Set tiles in place and rub or beat with small beating block.
  5. Beat or rap tile to ensure proper bond and also to level surface of tile.
  6. Align tile to show uniform joints and allow to set until firm.
  7. Clean excess mortar or adhesive from surface of tile with wet cheese cloth (not a sponge) while mortar is fresh.
  8. Allow face mounted tile to set until firm before removing paper and before grouting.
  9. Sound tile after setting. Replace hollow sounding tiles.
- F. Grouting, ANSI A108.9- 108.10:
1. Allow tiles to set a minimum of 48 hours before grouting.
  2. If bonding materials are rapid setting, follow manufacturer's recommendations.
  3. Install in accordance with grout manufacturer's recommendations and ANSI A108.10.
  4. Pack joints full and free before mortar takes initial set.
  5. Clean excess grout from surface with wet cheesecloth as work progresses. Do not use hydrosponges.
  6. Cure after grouting by covering with kraft or construction paper for 72 hours.
  7. Install sealant in vertical wall joints at interior corners.
- G. Sealing:
1. Allow grout to fully cure, 48 hours minimum.
  2. Thoroughly clean and prepare all surfaces of all grout and tile with manufacturer's cleaner and stripper product. Do not use cleaners containing ammonia, acids or bleach.
  3. Protect from any foot or equipment traffic prior to sealing.
  4. Apply first coat of clear sealer to all surfaces of all grout, per manufacturer's recommendations.

5. Once dried, apply a second coat of clear sealer to all surfaces of all grout and tile, per manufacturer's recommendations.
  6. Allow sealer to fully cure between coats and after final coat prior to any foot or equipment traffic atop.
  7. All grout surfaces to receive sealer, unless specifically indicated otherwise.
- H. Control Joints and Other Sealant Usage, ANSI-A108.1:
1. Install control joints where tile abuts any/all retaining surfaces such as perimeter walls, curbs, columns, wall corners and directly over cold joints and control joints in structural surfaces conforming to architectural details.
  2. Install control joint in floors at spacings as indicated in TCNA Installation Handbook, unless noted otherwise.
  3. Rake or cut control joints through setting bed to supporting slab or structure. Keep joints free of mortar.
  4. Install in full accordance with TCNA Installation Handbook.
  5. Fill joints with self-leveling polyurethane sealant and backing material as required.
  6. Fill joints around toilet fixtures with white silicone sanitary sealant.
- I. Expansion Joints:
1. Keep expansion joints free of mortar and grout.
  2. Use manufacturer's expansion joint flashing when covering expansion joints with waterproof or crack isolation membranes.
  3. Provide expansion joints directly over changes in material, over control and expansion joints in substrate, at juncture of floors and walls, at other restraining surfaces such as curbs, columns, bases, and wall corners, and where recommended by TCNA EJ171 Expansion Joint requirements.
  4. Install sealant in expansion joints.
  5. Provide sealant material at items penetrating tile work, unless otherwise indicated.
  6. Provide sealants and related materials in accordance with cited ANSI A108.1 and TCNA requirements.

### 3.04 ADJUSTING

- A. Sound tile after setting. Replace hollow sounding units.

### 3.05 CLEANING

- A. Clean excess mortar from surface with water as work progresses. Perform cleaning while mortar is fresh and before it hardens on surfaces.
- B. Sponge and wash tile diagonally across joints. Polish with clean dry cloth
- C. Remove grout haze following recommendation of mortar additive manufacturer. Do not use acids for cleaning.
- D. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.
- E. Wipe all sealer from glazed surfaces or any other surface that will not accept sealer. Clean tile surfaces to remove any residue and do not allow to dry on surface.

3.06 PROTECTION

- A. Prohibit traffic from floor finish for 72 hours after installation.
  
- B. Where temporary use of new floors is unavoidable, supply large, flat boards or plywood panels for walkways over kraft paper.
  
- C. Protect work so that it will be without any evidence of damage or use at time of acceptance.

SUBMITTAL CHECKLIST

- 1. Shop Drawings.
- 2. Samples.
- 3. Manufacturer's Product Data.

END OF SECTION 09300

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.

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. **New Panel System within Existing Ceiling Grid - Type "A":  
(Lay-in, 2'x2', Drop Edge)**

- a. Panel:
1. Model: "USG", Frost High-NRC/ High-CAC #489.
  2. Size: 2' x 2' x 7/8".
  3. Edge: Fineline Bevel.
  4. NRC: 0.80.
  5. Light Reflect: 0.89.
  6. Color: White.
- b. Existing Suspension System:
1. Profile: 2' x 2' grid, 9/16" flange.

2. **Panel and Suspension System Type "B":  
(Lay-in, 2'x2', Drop Edge)**

- a. Panel:
1. Model: USG", Frost High-NRC/ High-CAC #489.
  2. Size: 2' x 2' x 7/8".
  3. Edge: Fineline Bevel.
  4. NRC: 0.80.
  5. Light Reflect: 0.89.
  6. Color: White.
- b. Suspension System:
1. Model: "Armstrong", Prelude XL.  
"USG", Donn DX/DXL.
  2. Profile: 2' x 2' grid, 9/16" flange.
  3. Material: Hot dipped galvanized.
  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 09575 - EPOXY TERRAZZO

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, terrazzo flooring indicated, noted, and detailed on the drawings and specified herein.
- B. See Finish Plans for locations of terrazzo and other requirements.  
Drawings may also indicate specific colors, patterns and mixes to be provided.
- C. Matching new terrazzo to existing terrazzo.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS

Section 03300 - Cast-In-Place Concrete

1.03 QUALIFICATIONS

- A. Supplier's Qualifications:
  - 1. Suppliers shall provide materials in accordance with NTMA standards.
- B. Acceptable Installer:
  - 1. **Installer must be pre-qualified prior to bidding.**
  - 2. Installer shall be in good standing as a contractor member of NTMA, to perform all work in accordance with NTMA.
  - 3. Installers 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.
- C. Pre-Qualified Installers:
  - 1. **American Art Mosaic and Tile Co., Inc.**  
737 East Murry Street; Indianapolis, IN 46227  
(317) 786-2658; (317) 786-3075 fax
  - 2. **Art Mosaic & Tile Co., Inc.**  
844 Rush Street; South Bend, IN 46601  
(574) 287-8131; (574) 287-4863 fax
  - 3. **Blakley's Corporation**  
8060 East 88th Street; Indianapolis, IN 46256  
(317) 842-9600; (317) 845-1064 fax
  - 4. **F&M Tile & Terrazzo Co., Inc.**  
115 Chambeau Road; Fort Wayne, IN 46805  
(260) 483-6389; (260) 483-2474 fax
  - 5. **Martina Brothers Co.**  
300 Scott Street; Lexington, KY 40508  
(859) 255-3602; (859) 255-2075 fax
  - 6. **Santarosa Mosaic & Tile Co., Inc.**  
2707 Roosevelt Avenue; Indianapolis, IN 46218  
(317) 632-9494; (317) 631-5567 fax
  - 7. **Victory Services, Inc.**  
6831 E. 32<sup>nd</sup> Street, Suite 300; Indianapolis, IN 46218  
(317) 860-2940; (317) 860-2941 fax

- D. Source Limitations for Marble
  - 1. Obtain each color, grade, type and variety of marble from one source with resources to provide materials of consistent quality in appearance and physical properties without delaying the work.

1.04 SUBMITTALS

- A. Samples:
  - 1. Submit maximum of three samples, 5 inches x 6 inches for each color and type of terrazzo specified.
  - 2. Submit two 6-inch lengths of each type and kind of divider strips as specified.
  - 3. Terrazzo mix formulas including all matrix and aggregate components.  
Indicate manufacturer, product name and numbers, colors, sizes and percentages.
  - 4. Tag samples to match identification of colors as indicated on the Drawings and Finish Schedule.
- B. Manufacturer's Literature:
  - 1. Submit manufacturer's catalog information, specifications, data sheets, MSDS bulletins.
- C. Maintenance Literature:
  - 1. Submit two copies of NTMA maintenance recommendations.
- D. Certification:
  - 1. Suppliers shall furnish certification attesting that materials meet specification requirements.
  - 2. Suppliers shall furnish properly labeled material and Material Safety Data Sheets which comply to current state and federal requirements.
- E. Shop Drawings:
  - 1. Drawings indicating layouts of all terrazzo patterns, colors and color separations, expansion joints, control joints and divider strips.
  - 2. Indicate dimensions for patterns and accents and key items.
  - 3. Detailed, fully dimensioned drawings for logos, including all colors and patterns.
- F. Additional Submittals For Matching Existing Terrazzo:
  - 1. 12"x12" removed portion sample of existing terrazzo to compare new terrazzo to.
  - 2. Two 6"x6" sample of new terrazzo mix to compare to existing terrazzo sample.
  - 3. Laboratory test report indicating formula of existing terrazzo matrix and aggregates, indicating colors, types, sizes, ratios, proportions and mixes necessary to provide a match of new terrazzo.
  - 4. Formula of new terrazzo matrix and aggregates, indicating colors, types, sizes, ratios, proportions and mixes to provide a match to the existing terrazzo.
  - 5. Provide samples and formulas as listed for each and every differing existing terrazzo condition.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials:
  - 1. Deliver materials in a manner to prevent damage to containers and/or bags.
- B. Storage of Materials:
  - 1. Store materials in a clean, dry, temperature controlled location (50 - 90 degrees Fahrenheit).

1.06 PROJECT CONDITIONS

- A. Environmental limitations: Maintain temperature above 50 degrees Fahrenheit for 48 hours before and during terrazzo installation.
- B. Control and collect dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.

1. Provide dust proof partitions and temporary enclosures to limit dust and migration and to separate areas from noise.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Epoxy Matrix:
  1. Product:
    - a. "Terroxy Resin Systems", "Terroxy Epoxy Matrix".
  2. Description:
    - a. 3/8" nominal thickness.
    - b. Poured-in-place, pigmented, 100% solids.
    - c. Two-part matrix; mixed 5 parts A to 1 part B by volume.
  3. Color:
    - a. If indicated on Drawings, provide as selected by Architect.  
If not indicated, provide as selected by Architect from manufacturer's entire standard selection.
  4. The product shall meet the following minimum requirements:
    - a. Neat epoxy resins mixed in accordance with manufacturer's recommendations and tested without aggregate added. All specimens cured for 7 days at 75 degrees plus or minus 2 degrees Fahrenheit and 50% plus or minus 2% R.H.
    - b. Compressive Strength:  
Test Standards: ASTM D-695.  
Requirements: 15,500 psi.
    - c. Ultimate Tensile Strength:  
Test Standards: ASTM D-638.  
Requirements: 5,500 psi.
    - d. Tensile Elongation:  
Test Standards: ASTM D-638.  
Requirements: 4% - 8%.
    - e. Flexural Strength:  
Test Standards: ASTM D-790.  
Requirements: 4,000 psi.
    - f. Hardness:  
Test Standards: ASTM D-2240.  
Requirements: 65-85.
- B. Base Membrane:
  1. Product:
    - a. "Terroxy Resin Systems", "Iso-Crack Epoxy Membrane".
  2. Description:
    - a. 20 mils nominal thickness.
    - b. Flexible epoxy substrate primer, 100% solids.
    - c. Roller, brush, or spray applied.
- C. Marble Chip Aggregates:
  1. Type:
    - a. If indicated on Drawings, provide as selected by Architect.  
If not indicated, provide as selected by Architect from manufacturer's entire standard selection.
  2. Size:
    - a. If indicated on Drawings, provide as selected by Architect.  
If not indicated, provide as selected by Architect from manufacturer's entire standard selection.

- b. Combinations of multiple sizes may be selected by Architect to achieve a desired effect.
    - c. To conform to NTMA gradation standards.
  3. Mixture and Percentages:
    - a. If indicated on Drawings, provide as selected by Architect.  
If not indicated, provide as selected by Architect from manufacturer's entire standard selection.
    - b. Combinations of multiple mixtures and percentages may be selected by Architect to achieve a desired effect.
  4. Color:
    - a. If indicated on Drawings, provide as selected by Architect.  
If not indicated, provide as selected by Architect from manufacturer's entire standard selection.
    - b. Combinations of multiple colors and may be selected by Architect to achieve a desired effect.
  5. Hardness according to ASTM C-241 Ha-10 minimum.
  6. 24 hour absorption rate not to exceed 0.75 percent.
  7. Chips shall contain no deleterious or foreign matter.
  8. Dust content less than 1% by weight.
- D. Strips:
  1. Stop and divider "L" strips.
  2. White alloy of zinc.
  3. 16 gauge, minimum.
  4. No corrosive materials allowed as any component of the strips.
  5. Color:
    - a. If indicated on Drawings, provide as selected by Architect.  
If not indicated, provide as selected by Architect from manufacturer's entire standard selection.
    - b. Combinations of multiple colors may be selected by Architect to achieve a desired effect.
- E. Terrazzo Cleaner:
  1. Ph factor between 7 and 10, where applicable.
  2. Biodegradable and phosphate free.
  3. Provide and use in accordance with manufacturer's recommendations.
- F. Sealer:
  1. Product:
    - a. "Terroxy Resin Systems", "Terroxy Water Based Urethane Sealer".
  2. Ph factor between 7 and 10, where applicable.
  3. Shall not discolor or amber.
  4. Flash Point: ASTM D-56, 80 degrees Fahrenheit minimum, where applicable.
  5. Provide and use in accordance with manufacturer's recommendations.
- G. Concrete Slab Primers and Sealers:
  1. Where slab's moisture content exceeds required acceptable installation levels:  
Provide primers and sealers as required by flooring manufacturer to achieve the proper moisture content on all concrete slabs and substrates for installation of flooring.
  2. Where existing substrate is unacceptable for adhesion or bonding of new materials:  
Provide primers and sealers as required by flooring manufacturer to achieve the proper substrate conditions for installation of flooring.
  3. May be required as a result of phasing or scheduling or to maintain the project schedule.

2.02 MIXES

- A. Terrazzo Selection:
  - 1. Preliminary mixes may be indicated on the Drawings.  
If not indicated, the contractor and supplier must work with the Architect for selection.
  - 2. Submit samples and mixes to Architect as trials for consideration.
  - 3. Create mockups as requested for review until selection is made, regardless of quantity.
  - 4. Architect reserves right to alter mixes for aesthetic appeal and desired mix.
  
- B. Proportions of Terrazzo Topping:
  - 1. Epoxy Terrazzo Topping:
    - a. In accordance with resin supplier's recommendations.
  
- C. Mixing of Terrazzo Topping:
  - 1. Charge and mix marble chips and epoxy resin in accordance with supplier's instructions.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine areas to receive terrazzo for:
  - 1. Defects in existing work that affect proper execution of terrazzo work.
  - 2. Deviations beyond allowable tolerances for the concrete slab work.
    - a. Sub floor not to vary more than 1/4 inch from true plane in 10 feet.
    - b. Sub floor may have curing finish atop that requires special preparation prior to installation of terrazzo flooring finish.
  
- B. Installation of terrazzo constitutes acceptance of slab condition by the installer.

3.02 INSTALLATION

- A. Sub Floor Preparation:
  - 1. Allow new concrete substrate to cure 28 days or prepare with a sealer or primer as required.
  - 2. Prepare substrate mechanically to receive epoxy terrazzo in accordance with manufacturer's recommendations and to provide proper bonding and adhesion as is required by the specific conditions of the actual substrate in question.
  - 3. Install control strips directly above control joints in sub floor.
  - 4. Install divider strips as shown on drawings or as otherwise directed by Architect.
  - 5. If curing agent is present on existing concrete slab, the sub floor surface must be shot blast.
  - 6. Prime substrate with base membrane, over all entire substrate surfaces, in accordance with manufacturer's recommendations.
  - 7. Allow base membrane to cure in accordance with manufacturer's recommendations.
  
- B. Placing Terrazzo:
  - 1. Provide mix of aggregates and matrix to blend to exactly match color and finish required.
  - 2. Place terrazzo mixture and trowel compact to a dense flat surface to top of divider strips.
  - 3. Allow to cure in accordance with manufacturer's recommendations.
  
- C. Finishing:
  - 1. Finish to specified nominal thickness.
  - 2. Rough Grinding:
    - a. Grind with 24 or finer grit stones or with comparable diamond plates.
    - b. Follow initial grind with 80 or finer grit stones.

3. Grouting:
  - a. Cleanse floor with clean water and rinse.
  - b. Remove excess rinse water, dry and prep for void filling.
  - c. Grout surface with epoxy matrix, to seal the surface and fill voids, pores, and pinholes.
4. Cure Grout:
  - a. Allow the floor to cure in accordance with manufacturer's recommendations.
  - b. Grout may be left on terrazzo until all heavy and messy work in project area is completed.
5. Fine Grinding:
  - a. Intermediate grind with 80 or finer grit stones until all grout is removed from surface.
  - b. Follow intermediate grind and fine grind with 120 or finer grit stones.
  - c. Upon completion of grinding, terrazzo shall show a minimum of 70% marble chips.
  - d. Clean surface thoroughly in accordance with manufacturer's recommendations.
6. Sealing:
  - a. Grouting, grinding, and polishing procedures may require repeat treatment prior to sealing if porosity remains.
  - b. Seal terrazzo only after being accepted by Owner and Architect.
  - c. Seal with specified polish seal in accordance with manufacturer's recommendations.

D. Install terrazzo within rooms wall to wall. Install prior to installation of any fixed casework, equipment, or items within room, so as to be installed continuous underneath.

E. All grinding and sanding to be accomplished via a wet grinder and wet grinding/sanding techniques. Dry grinding and sanding is only permitted by express permission of the Architect.

### 3.03 CLEANING AND SEALING

- A. Wash all surfaces with a neutral cleaner.
- B. Rinse with clean water and allow surface to dry.
- C. Apply sealer in accordance with manufacturer's directions.

### 3.04 PROTECTION

- A. Upon completion, the work shall be ready for final inspection and acceptance by the Owner and the Architect.
- B. Protect the finished floor until Final Acceptance of the project.

### 3.05 MATCHING NEW TERRAZZO TO EXISTING TERRAZZO

- A. Remove a portion of existing terrazzo, in an area of demolition or area of least conspicuous construction as approved by the Architect, to provide a physical sample of each and every differing condition of existing terrazzo that is to be matched to. Samples to be size as required by the submittals listed herein and retained throughout the duration of construction for comparison of new to existing.
- B. In addition to the comparison samples listed above, remove a portion of existing terrazzo for use as representative samples for each and every differing condition of existing terrazzo for sending to a laboratory for determination of existing mix. Sizes of these samples are to be as determined by and required by the laboratory.
- C. Provide a laboratory test report for each and every differing condition of existing terrazzo indicating formula of existing terrazzo matrix and aggregates, indicating colors, types, sizes, ratios, proportions and mixes necessary to provide a match of new terrazzo.



- D. Provide a formula of new terrazzo matrix and aggregates, indicating colors, types, sizes, ratios, proportions and mixes to provide a match to the existing terrazzo, illustrating match to the existing terrazzo formulas provided by the laboratory.
- E. Provide physical samples, in size as required by the submittals listed herein, for new terrazzo for each and every differing existing terrazzo condition to which the new is matching to.
- F. Submit all samples and formulas to Architect for review and approval.  
Repeat process until matches are acceptable to the Architect.
- G. Installed new terrazzo must match comparison samples of existing terrazzo retained on site as well as the new samples approved by the Architect. Any areas deemed by the Architect to not provide the acceptable match are to be removed and replaced by the Contractor at no additional costs to the Owner or Architect.
- H. Contractor to install a strip, straight and true, at each location where new terrazzo abuts existing terrazzo. Coordinate layout of strip locations with Architect prior to installation for desired pattern or locations needed to provide an acceptable layout within the space in question.

SUBMITTAL CHECKLIST

- 1. Samples.
- 2. Manufacturer's Literature.
- 3. Maintenance Literature.
- 4. Certification.
- 5. Shop Drawings.
- 6. Additional Submittals For Matching Existing Terrazzo.

END OF SECTION 09575

SECTION 09650 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Section Includes:
  - 1. Luxury Vinyl Tile.
  - 2. Vinyl Composition Tile.
  - 3. Rubber Base.
  - 4. Resilient flooring accessories.
- B. Furnish labor, materials, equipment, special tools, supervision and services required for floor preparation for tile installation.
- C. 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. Flooring:
    - a. 6"x6" actual tiles 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.
  - 2. 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 ACCEPTABLE MANUFACTURERS

- A. Provide products, as approved by the Architect, from one of the following approved manufacturers:
  - 1. Luxury Vinyl Tile:
    - a. "Interface"

2. Vinyl Composition Tile:
  - a. "Armstrong Commercial".
3. Rubber Base:
  - a. "Flexco".

2.02 MATERIALS

- A. Luxury Vinyl Tile:
  1. Type: as shown on Drawings.
  2. Size: as shown on Drawings.
  3. Finish: as shown on Drawings.
  4. Color: as shown on Drawings.
  5. Wear Layer Thickness: .030" Clear.
  6. Overall Thickness: .120"/ 3mm (nominal).
  7. Warranty: 20-year wear warranty.
- B. Vinyl Composition Tile:
  1. Type: as shown on Drawings.
  2. Size: as shown on Drawings.
  3. Finish: as shown on Drawings.
  4. Color: as shown on Drawings.
  5. 1/8" thickness.
  6. FS SS-T-312B, Type IV.
- C. 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.
- D. Rubber Base Adhesive:
  1. Comply with recommendations of rubber base manufacturer.
- E. Rubber or Vinyl Reducer Strips:
  1. 1-1/2" wide, trim to match tile thickness.
  2. Finish: as selected from manufacturer's entire selection.
- F. VCT Floor Wax:
  1. FS P-W-155, 6 percent concentration, slip-resistant water emulsion type.
  2. Type and rate of application as per manufacturer.
- G. Concrete Slab Primers and Sealers:
  1. Where existing substrate is unacceptable for adhesion or bonding of new materials:  
Provide primers and sealers as required by flooring manufacturer to achieve the proper substrate conditions for installation of flooring.
  2. Scarify, shot-blast, or sand-blast floor as required at no change in bid price.
- H. Leveling Compound:
  1. Latex type as recommended by flooring manufacturer.
- I. Subfloor Leveler System:
  1. Equal to: "Johnsonite", Subfloor Leveler System.

2. Resilient PVC gradual sloping ramped wedged materials.
3. Provide slope, profile, and lengths as required for specific condition.

### 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 flooring. Do not install directly over plywood. Provide luan underlayment over all plywood decks. Commencement of installation of materials constitutes acceptance of the substrates.
- C. Work shall not be started until all items penetrating the flooring have been installed.
- D. No flooring 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. Spaces in which resilient flooring is being installed shall be closed to traffic or other work.
- F. When solvent-based adhesives are used, the space shall be ventilated; use spark proof fans if natural ventilation is inadequate. Prohibit all smoking.
- G. Before installing flooring, test concrete floor for excessive moisture by taping an 18" x 18" mat of rubber or vinyl sheet material to floor at edges with masking tape. If condensation is apparent on the underside of the sheet after 24 hours, do not install flooring.
- H. Before installing flooring, fill all cracks and holes and level depressions with underlayment compound. Surfaces shall not vary more than 1/8" in 10' in any dimension.
- I. Before installing flooring, test concrete floor for acceptable adhesion and bonding of new materials atop substrate. If proper adhesion and bonding are not apparent, do not install flooring until sealer and primer are applied. Scarify, shot-blast, or sandblast floor if required to install sealer/primer.
- J. Install floor tiles wall to wall, under all moveable casework and cabinets, under all open counter areas, and up to fixed equipment and casework.

#### 3.02 INSTALLATION

- A. Install flooring and products in accordance with the manufacturer's recommendations.
- B. Apply all concrete slab primers and sealers as required to achieve an acceptable substrate for installation of flooring per flooring manufacturer's requirements. Apply when areas are ready or scheduled to receive flooring without delays to the project or schedule, and without any additional costs or change in time. If floor is required to be sandblasted, shot-blasted, scarified, or otherwise prepared, perform this work at no additional cost or change in time. This includes, but is not limited to, floor slabs which are not acceptable due to excessive moisture content.
- C. Install subfloor leveler at all doors and openings as required so as to maintain a smooth, flat, and true transition between these flooring materials and adjacent flooring materials.

- D. Mix and apply adhesive as recommended by the manufacturer. Lay flooring so that fields or patterns center on areas. Adjust pattern so that edge pieces shall not be less than 1/2 size. Lay flooring true to line, level, and with tight joints. Cut flooring to and around all permanent cabinets and bases. Roll flooring to assure contact and proper adhesion to substrate.
- E. Apply wall 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.
- F. Remove excessive adhesive in accordance with flooring manufacturer's instructions.
- G. Install edge strips at termination of flooring where substrate is exposed and extends beyond.
- H. Install edge strips at doors, openings, and any and all other junctions of this flooring and adjacent flooring materials. Firmly anchor strips to subfloor with adhesive. Make transition in floor finish at centerline of door bottom or opening through wall.
- I. After installation, maintain a minimum space temperature of 55 degrees F.
- J. Installation of rubber base at profiled column enclosure:
  - 1. Applies to all rubber base products designed for square corners, not bullnose type.
  - 2. Traditional wall base profiles should be able to wrap the radius of the wall surface with no issues, but if issues exist, adhesion is a problem, a short return exists, or profiles are non-standard, then the use of a heat gun and pipe shall be required.
  - 3. The material shall be draped over the pipe that matches the radius of the wall, then apply heat to the surface until the material softens.
  - 4. Next the base shall be placed into a container of cold water to change the memory and profile.
  - 5. Then the pieces shall be cut to the proper and full length of the area and return.
  - 6. Apply contact adhesive, type as per the manufacturer's recommendations, for short returns.

3.03 VINYL COMPOSITION TILE AND RUBBER BASE CLEANING

- A. Not less than 4 days after flooring installation, clean all VCT floor tile and base. Wash thoroughly, with a cleaner recommended by the flooring manufacturer, in accordance with flooring manufacturer's recommendations.
- B. Polish all flooring surfaces with wax and mechanical buffer. Apply minimum two (2) coats of wax.

3.05 LUXURY VINYL TILE POST-INSTALLATION/ INITIAL CLEANING

- A. Wait 48 hours after flooring installation before performing initial cleaning.
- B. Sweep, dust mop or vacuum the floor thoroughly to remove all loose dust, dirt, grit and debris.
- C. Remove any dried adhesive residue with a clean cloth dampened with mineral spirits.
- D. Wash thoroughly, with a cleaning solution using a pH neutral cleaner in accordance with flooring manufacturer's recommendations. The dilution ratio depends on light to heavy soil conditions.
- E. Let cleaning solution dwell for 5 to 15 minutes.
- F. Scrub the flooring using approved floor scrubber system equipped with manufacturers recommended pad.
- G. Remove the cleaning solution using a wet vacuum.
- H. Rinse the floor thoroughly with fresh, clean water.
- I. Remove the rinse water and allow the floor to dry completely before allowing foot traffic.
- J. Repeat the rinse process if necessary to move any visible haze.

SUBMITTAL CHECKLIST

1. Manufacturer's Literature.
2. Samples.

END OF SECTION 09650

SECTION 09680 - CARPETING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, supervision and services required for floor preparation for carpet installation.
- B. Furnish labor, materials, equipment, special tools, supervision and services required to manufacture, deliver and install all carpet indicated, noted and detailed on the Drawings and as specified herein.

1.02 QUALITY ASSURANCE

- A. Installer Qualifications:
  - 1. Installer who can demonstrate successful experience with installations on projects of similar size and scope to this project.
- B. Requirements and Regulatory Agencies:
  - 1. Provide carpet and padding which meets the following requirements.
    - a. Flame Spread: ASTM E84, 75 or less.
    - b. Radiant Panel Test: ASTM E648, .45 watts/CM2, or more.
    - c. Smoke Density Test: ASTM E662, 450 or less.
    - d. Pill Test: DOC FF-1-70, pass.
    - e. Meet local Fire Marshal's requirements.

1.03 SUBMITTALS

- A. Samples:
  - 1. Where colors are specified, submit one 12 inch x 18 inch sample of each color specified.
  - 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 of carpet. Submit additional or larger samples of selected colors upon request.
- B. Shop Drawings and Manufacturer's Literature:
  - 1. Seaming diagram indicating:
    - a. Pattern direction.
    - b. Location of seams.
    - c. Location of edge strips.
    - d. Dimensions of carpeted areas.
- C. Independent Testing Laboratory Test Reports:
  - 1. Fire hazard classifications.
  - 2. Static control.
  - 3. Construction.
- D. Certificates:
  - 1. Manufacturer's certification that rolls furnished were manufactured in accordance with specification requirements, stating yarn and weight, backing and weight and average tuft bind.
  - 2. Installer's list of comparable installations

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver:
  - 1. Deliver carpet in original mill wrappings with register number tabs attached or stenciled on bale.

2. Do not deliver materials until installation is ready to begin.

B. Storage:

1. Store materials in dry, well ventilated space.
2. Do not store carpet rolls on end.

C. Handling:

1. Handle to protect from dirt and stains.

1.05 GUARANTEE / WARRANTY

A. Warrant the following items for the lifetime of the carpet face:

1. Wear: Not abrasively wear more than 10% face yarn weight under normal use.
2. Static Electricity: Maintain specified levels of static electricity generation.
3. Edge ravel: Will not occur under normal use.
4. Delamination: Will not occur under normal use.
5. Tuft Bind: Average face year tuft bind of 20 lbs.; will not zipper, wet or dry.

B. Adjustment:

1. During project guarantee period and within 15 days written notice from Owner or Architect, repair seams, edges and any other irregularity.

1.06 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 ACCEPTABLE MANUFACTURERS

A. Provide products, as approved by the Architect, from one of the following approved manufacturers:

1. "Interface"
2. "Shaw Contract Group"

2.02 CARPET

A. Type:

1. Modular Carpet Tile products as indicated on the Drawings.
2. Colors and patterns as indicated on the Drawings. If not indicated, colors and patterns are to be selected by Architect from manufacturer's entire selection for the specific carpet family specified.

B. Static Electricity Generation (all carpet):

1. Control Fiber: Stainless steel, aluminum, copper, or other metal, blended with carpet fiber, or by specific fiber blend.
2. Maximum 3,000 volts at 20% relative humidity and 70°F temperature, AATCC-134-75.

2.03 INSTALLATION MATERIALS

A. Adhesive:

1. Carpet Adhesive:
  - a. Per carpet manufacturer for substrate and warranty requirements.
  - b. Nonflammable.
2. Seam Adhesive:
  - a. Latex base per carpet manufacturer.



- B. Concrete Slab Primers and Sealers:
  - 1. Where existing substrate is unacceptable for adhesion or bonding of new materials:  
Provide primers and sealers as required by flooring manufacturer to achieve the proper substrate conditions for installation of flooring.
- C. Subfloor Leveler System:
  - 1. Equal to: "Johnsonite", Subfloor Leveler System.
  - 2. Resilient PVC gradual sloping ramped wedged materials.
  - 3. Provide slope, profile, and lengths as required for specific condition.
- D. Seaming Tape:
  - 1. "Orcon", Super-35.
- E. Edge Strips:
  - 1. Extruded, anodized aluminum bar reducer at exposed edges.
  - 2. Undercut, flanged.

### PART 3 - EXECUTION

#### 3.01 PREPARATION

- A. Examination: Examine surfaces scheduled to receive carpeting for:
  - 1. Defects that will adversely affect the execution and quality of work.
  - 2. Deviation beyond allowable tolerances for carpet installation over concrete as indicated in Section 03300.
- B. Conditions of Surfaces:
  - 1. Do not install carpet over concrete substrate until concrete has cured minimum of 30 days.
  - 2. Check floor moisture content. Seal inverted glass tumbler to floor with putty. If condensation forms in 48 hours, do not install carpet.
  - 3. Do not start until unsatisfactory conditions are corrected.
  - 4. Install carpeting prior to installation of movable partitions and electrical floor outlets.
- C. Prime floor slab as recommended by manufacturer.
- D. Apply all concrete slab primers and sealers as required to achieve an acceptable substrate for installation of flooring per flooring manufacturer's requirements. Apply when areas are ready or scheduled to receive flooring without delays to the project or schedule, and without any additional costs or change in time. If floor is required to be sandblasted, shot-blasted, scarified, or otherwise prepared, perform this work at no additional cost or change in time. This includes, but is not limited to, floor slabs which are not acceptable due to excessive moisture content.

#### 3.02 INSTALLATION OF DIRECT GLUE DOWN CARPET

- A. Install carpet in accordance with submitted seam diagram, and manufacturer=s instructions.
- B. Run all carpet seams in same direction.
- C. Lay carpet with minimum number of seams using minimum carpet sections in each room or space.
- D. Fit carpet neatly into breaks and recesses, against bases, around pipes and penetrations, under saddles and thresholds, and around permanent cabinets and equipment.

- E. Seaming (seams shall be invisible):
  - 1. Cement seams.
  - 2. Trim length seams.
  - 3. Coat cut edges with seam adhesive.
  - 4. Layout length of rolls so cross seams do not occur at conspicuous locations, near doors or pivot points.
  - 5. Do not place seams perpendicular to doors or entries.
  - 6. Center seams at doors directly under door.
  - 7. Where seams occur at corridor change of direction, follow wall parallel to carpet direction.
  - 8. Bond all seams at warp line.
  
- F. Application of Adhesive:
  - 1. Mix and apply adhesives in accord with manufacturer=s instructions.
  - 2. Do not soil walls, bases, or adjacent areas with adhesive.
  - 3. Promptly remove any spillage.
  - 4. Apply contact or seam adhesive 6 inches wide along carpet edges abutting walls and at cross-seams.
  
- G. Roll carpet to remove air bubbles and insure bond.
  
- H. Install carpeting wall to wall, under all moveable casework and cabinets, under all open counter areas, and up to fixed equipment and casework.

3.03 ADJUST AND CLEAN

- A. Cleaning:
  - 1. Remove spots and smears of cement from carpet immediately with solvent or adhesive remover.
  - 2. Remove rubbish, wrapping paper, salvages and scraps less than 2 square feet or less than 8 inches in any dimensions.
  - 3. Upon completion, vacuum with a commercial beater bar type vacuum cleaner.
  
- B. Protection:
  - 1. After each area of carpet has been installed, protect from soiling and damage.
  - 2. The use of tape to hold down floor protection is prohibited.
  - 3. The use of adhesive film floor protection is prohibited.

SUBMITTAL CHECKLIST

- 1. Samples.
- 2. Seaming Diagram.
- 3. Testing Laboratory Reports.
- 4. Certificate of Manufacturer's Compliance.

END OF SECTION 09680

SECTION 09722 – TEXTILE WALLCOVERINGS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Extent of wallcoverings required is indicated on drawings and in schedules.
- B. Types of wallcovering to be furnished include the following:
  - 1. Textile Wallcovering installed over plywood and cork substrate.

1.02 QUALITY ASSURANCE

- A. Installer: A firm specializing in installation of textile wallcovering work with not less than three years of experience in installing wallcovering 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. Do not store rolled goods in upright position. Maintain temperature in storage area above 40°F.
- 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 and installation instructions.
- B. Samples:
  - 1. Submit actual samples of wallcovering selected. If not selected, submit samples for selection by the Architect from manufacturer's entire selection of type indicated.
- C. Certificate:
  - 1. Manufacturers shall submit to Architect upon request, a certificate of compliance that wallcovering used meets specification and modifications outlined herein.

1.04 MOCK-UP PANEL

- A. Prepare finished substrate of an actual area scheduled to receive textile wallcovering.
- B. Install selected color and pattern.
- C. Minimum area 8' x 8' with 2 seam conditions.
- D. All color(s), pattern(s) must be approved prior to final ordering of material.
- E. Remove samples so all material installed is from same production run.

1.05 MAINTENANCE MATERIALS AND DATA

- B. Submit maintenance data under provisions of Section 01780 - Closeout Submittals.

## PART 2 - PRODUCTS

### 2.01 MATERIAL

- A. Textile Wallcovering:
  - 1. Content: 96% Recycled Polyester, 4% Lurex
  - 2. Backing: Acrylic/ Latex
  - 3. Finish: Teflon stain repellent
  - 4. Weight: 13 oz.
  - 5. Width: 54 inches
  - 6. When tested in accordance with ASTM E-84 Surface Burning Characteristics of Building Materials, textile wallcovering must meet the requirements of Class A of NFPA-101, Life Safety Code, with Flame Ratings in the Range of 0-25.
  - 7. This material must meet classifications in accordance with ASTM E-84 tunnel test.
  - 8. Abrasion Resistant: ASTM D-4157-02 (100,000 Double rubs).
  - 9. Color Fastness to Light: AATCC-16A (Class 5.0/40 hours).
  
- B. Adhesives and Primers:
  - 1. As recommended by manufacturer of wallcovering for specific substrate.

## PART 3 - EXECUTION

### 3.01 PREPARATION

- A. Acclimatize wallcovering materials by removing from packaging in area of installation not less than 72 hours before application.
  
- B. Remove switchplates, wall plates, and surface-mounted fixtures in areas where textile wallcovering is to be applied.
  
- C. Prime and seal substrates in accordance with wallcovering manufacturer=s recommendations for type of substrate. Apply surface sealer to cork substrate.

### 3.02 INSTALLATION

- A. Install according to manufacturer=s instructions and recommendations.
  
- B. Place wallcovering panels consecutively in order cut from consecutively numbered rolls.
  
- C. Edges should be trimmed using a straightedge with a sharp blade.
  
- D. Apply adhesive to back of wallcovering and place in accordance with manufacturer’s instructions. Install seams plumb, and at least 6@ away from corners. Horizontal seams are not permitted. Remove air bubbles, wrinkles, blisters and other defects. Cut wallcovering evenly to edges of outlet boxes or support.

### 3.03 ADJUST AND CLEAN

- A. Replace removed plates and fixtures; verify cut edges of textile wallcoverings are completely concealed.
  
- B. Remove surplus materials, rubbish, and debris resulting from textile wallcovering installation upon completion of work, and leave areas of installation in neat, clean condition.
  
- C. Clean wallcovering of all stains, marks and adhesives.

SUBMITTAL CHECK LIST

1. Product Data.
2. Samples.
3. Certificate.

END OF SECTION 09722

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.
- 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. Stain one (1) wood door complete, as directed by Architect.
4. Mock-ups shall indicate color, texture and finish.
5. Do not proceed with paint work until mock-ups have been approved by the Architect.
6. 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.
7. Once an approved mock-up has been achieved, use as a standard of comparison for all work.
8. Do not destroy or remove mock-up until all paint work is complete and accepted.
9. 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.

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.

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. Interior Wood Scheduled to Receive Transparent Finish:
  - 1. Remove loose dust, dirt, grit and foreign matter.
  - 2. Set nails and screws.
  - 3. Fill nail and screw holes, cracks and blemishes after staining with filler to match color wood or stain.
  - 4. Sand smooth.
  
- H. Interior Wood Items Scheduled to Receive Paint Finish:
  - 1. Wipe off dust and grit prior to priming.
  - 2. Seal knots, pitch streaks and sappy sections with sealer.
  - 3. Fill nail holes and cracks after primer has dried; sand between coats.
  
- K. Wood Doors, Metal Doors and Metal Frames:
  - 1. Apply one coat of paint to glazing stops and rabbets prior to glazing.
  
- M. New Wood:
  - 1. Prime, stain or seal wood required to be job-painted, immediately upon delivery to job.
  - 2. Prime edges, ends, faces, undersides, and backsides of such wood.
  
- N. Existing Wood:
  - 1. Lightly sand and clean to remove dirt, grease, oils, etc.
  - 2. Patch and repair any surface damage prior to re-finishing.
  
- O. Previously Coated Surfaces:
  - 1. Maintenance painting will frequently not permit or require complete removal of all old coatings prior to repainting. However, all surface contamination such as oil, grease, loose paint, mill scale, dirt, foreign matter, rust, mold, mildew, mortar, efflorescence and sealers must be removed to assure

- sound bonding to the tightly adhering old paint.
- 2. Feather edges of existing coating to make touch-up patches inconspicuous.
- 3. Glossy surfaces of old paint films must be clean and dull before repainting. Accomplish by sanding or thoroughly washing with an abrasive cleanser.
- 4. Spot prime any bare areas with an appropriate primer.
- 5. Provide compatibility tests per submittal requirements herein.
- 6. If the coating proves incompatible, complete removal is required.

P. 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).

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. Renovation and Patching Areas:
  - 1. Prepare and prime new construction portions of surfaces per specifications
  - 2. Prepare existing surfaces located in the same plane as renovation or patching per specifications.
  - 3. Paint area of renovation and patching entire surface full height, from “floor-to-ceiling” and from "corner-to-corner".

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 PAIN SYSTEM SCHEDULE - EXTERIOR PAINT SYSTEMS

- A. STEEL, ALL TYPES (exterior, existing and/or previously painted, painted finish):
- 1st Coat - Rust-Inhibitive Metal Primer  
"S-W, Kem Bond HS, Universal Metal Primer"  
\*Color selected as most appropriate beneath finish topcoats.  
\*Additional coats as required to cover existing color or correct rusting.  
\*Painter responsible to visit site and field verify surface prep required.
  - 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.
- B. METAL DOORS AND FRAMES (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.  
\*Additional coats as required by Architect to achieve desired and intended result.
- C. METAL DOORS AND FRAMES (exterior, existing and/or previously painted, painted finish):
- 1st Coat - Rust-Inhibitive Metal Primer  
"S-W, Kem Bond HS, Universal Metal Primer"  
\*Color selected as most appropriate beneath finish topcoats.  
\*Additional coats as required to cover existing color or correct rusting.  
\*Painter responsible to visit site and field verify surface prep required.
  - 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.

3.10 PAIN T SYSTEM SCHEDULE - INTERIOR PAINT SYSTEMS

- A. CONCRETE MASONRY UNITS (interior, new construction, painted finish):
- 1st Coat - Acrylic Block Filler  
"S-W, Heavy-Duty Block Filler, Interior/Exterior Acrylic, B42W46"  
\*Apply filler coat at a rate to ensure complete coverage with pores filled.
  
  - 2nd Coat - Interior Latex Topcoat  
"S-W, ProMar 200 Zero VOC, Interior Latex, Eg-Shel"
  
  - 3rd Coat - Interior Latex Topcoat  
"S-W, ProMar 200 Zero VOC, Interior Latex, Eg-Shel"
- B. STEEL, ALL TYPES (interior, existing and/or previously painted, painted finish):
- 1st Coat - Rust-Inhibitive Metal Primer  
"S-W, Kem Bond HS, Universal Metal Primer"  
\*Color selected as most appropriate beneath finish topcoats.  
\*Additional coats as required to cover existing color or correct rusting.  
\*Painter responsible to visit site and field verify surface prep required.
  
  - 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. 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.
- D. METAL DOORS AND FRAMES (interior, existing and/or previously painted, painted finish):
- 1st Coat - Rust-Inhibitive Metal Primer  
"S-W, Kem Bond HS, Universal Metal Primer"  
\*Color selected as most appropriate beneath finish topcoats.  
\*Additional coats as required to cover existing color or correct rusting.  
\*Painter responsible to visit site and field verify surface prep required.
  
  - 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.

- E. GYPSUM DRYWALL / PLASTER WALL SURFACES (interior, new construction, painted finish):
- 1st Coat - Latex Primer  
"S-W, ProMar 200 Zero VOC, Interior Latex Primer, B28W02600"  
\*Tinted toward final color.
  - 2nd Coat - Interior Latex Topcoat  
"S-W, ProMar 200 Zero VOC, Interior Latex, Eg-Shel"
  - 3rd Coat - Interior Latex Topcoat  
"S-W, ProMar 200 Zero VOC, Interior Latex, Eg-Shel"
- F. GYPSUM DRYWALL / PLASTER WALL SURFACES (interior, existing and/or previously painted, painted finish):
- 1st Coat - Latex Primer  
"S-W, ProMar 200 Zero VOC, Interior Latex Primer, B28W02600"  
\*Painter responsible to visit site and field verify surface prep required.  
\*Additional coats as required to cover existing color and texture.
  - 2nd Coat - Interior Latex Topcoat  
"S-W, ProMar 200 Zero VOC, Interior Latex, Eg-Shel"
  - 3rd Coat - Interior Latex Topcoat  
"S-W, ProMar 200 Zero VOC, Interior Latex, Eg-Shel"
- G. GYPSUM DRYWALL / PLASTER CEILING AND SOFFIT SURFACES (interior, existing and/or previously painted, painted finish):
- 1st Coat - Latex Primer  
"S-W, PrepRite ProBloc, Interior/Exterior Latex Primer/Sealer, B28W02600"  
\*Painter responsible to visit site and field verify surface prep required.  
\*Additional coats as required to cover existing color and texture.
  - 2nd Coat - Interior Latex Topcoat  
"S-W, ProMar 200 Zero VOC, Interior Latex, Flat "
  - 3rd Coat - Interior Latex Topcoat  
"S-W, ProMar 200 Zero VOC, Interior Latex, Flat "
- H. WOODWORK (interior, new construction, painted finish):
- Filler - Pore Filler (for open-grained wood only)  
"S-W, Sher-Wood, Natural Filler"  
\*Do not sand filler coat. Allow to completely dry before topcoating.
  - 1st Coat - Alkyd Primer  
"S-W, ProBlock, Interior Oil-Based Primer, B79W8810"
  - 2nd Coat - Interior Latex Topcoat  
"S-W, ProClassic Waterborne Interior Acrylic, Semi-Gloss, B31 Series"
  - 3rd Coat - Interior Latex Topcoat  
"S-W, ProClassic Waterborne Interior Acrylic, Semi-Gloss, B31 Series "

- I. WOODWORK (interior, new construction, stained/transparent finish):
- Filler - Pore Filler (for open-grained wood only)  
"S-W, Sher-Wood, Natural Filler"  
\*Do not sand filler coat. Allow to completely dry before topcoating.  
\*Tint towards shade of stain.
  
  - 1st Coat - Interior Oil Stain  
"S-W, Wood Classics, Interior Oil Stain, A49-200 Series" (quart size)  
"S-W, Wood Classic, Interior Oil Stain 250, A49-800 Series" (gallon size)
  
  - 2nd Coat - Interior Oil Varnish  
"S-W, Wood Classics, Waterborne Polyurethane Varnish, A68 Series, Satin"
  
  - 3rd Coat - Interior Oil Varnish  
"S-W, Wood Classics, Waterborne Polyurethane Varnish, A68 Series, Satin"
  
  - 4th Coat - Interior Oil Varnish  
"S-W, Wood Classics, Waterborne Polyurethane Varnish, A68 Series, Satin"  
\*Sand between each coat, unless otherwise indicated.

SUBMITTAL CHECKLIST

1. Product Data.
2. Samples and Draw Downs.
3. Mock-Ups.
4. Compatibility Tests.

END OF SECTION 09900

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. 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. 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. Tackboards (Frameless):
1. Surface: 15 oz. polyester fabric equal to "Guilford of Maine" Anchorage.
  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.
  6. All panels to be fully edge-wrapped with continuous fabric from face surface. Corners to be fully mitered or folded without splits or breaks between edges. Provide wrapped edge butt joints where panels abut one another.
  7. Provide securing fasteners at each corner of all panels. Fasteners to be finished plated screws with flush-type receiving washer.
- B. Mounting:
1. Provide on all types of visual display boards.
  2. Wall attachment hardware, concealed from view, unless specifically indicated otherwise.

### 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 height as specified, unless noted otherwise. Verify with Architect prior to installation.

#### SUBMITTAL CHECK LIST

1. Shop Drawings.
2. Maintenance Instructions.
3. Samples.

END OF SECTION 10100

SECTION 10260 – WALL AND CORNER GUARDS

PART 1 – GENERAL

1.01 WORK INCLUDED

- A. Extent of wall and corner guards as indicated on Drawings and specified herein.

1.02 QUALITY ASSURANCE

- A. Deliver materials to project site in original packages or containers clearly labeled to identify manufacturer, brand name, quality or grade and fire hazard classification.
- B. Store materials in original undamaged packages or containers. Store materials in a clean, dry location protected against damage of any kind.
- C. 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 and installation instructions.
  2. Include data on physical characteristics, durability, fade resistance and flame resistance characteristics.
- B. Samples:
1. Submit actual samples of corner guards selected. If color not selected, submit samples for selection by the Architect from manufacturer's entire selection of type indicated. Printed color chart alone is not acceptable.

1.04 WARRANTY

- A. Provide manufacturer's standard 5-year warranty.

PART 2 – PRODUCTS

2.01 MATERIAL

- A. Provide one of the following approved products as indicated on the Drawings:
1. Lexan Corner Guards:  
"Koroseal Wall Protection Systems"; Lexan Corner Guards Series.
    - a. Description:
      1. High-impact lexan polycarbonate.
      2. Exposed surfaces shall be free of wrinkling, chipping, discoloration, or other imperfections.
      3. Dimensions: Leg length: 3/4", Angle: 90 degrees.
      4. Flame Resistance: Class I fire rating, when tested in accordance with ASTM E 84.
      5. Color: as shown on Drawings.
      6. Impact Resistance: 16 ft. lbs./inch as tested per ASTM D256-A.
      7. Attach to substrate with screws.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Verify that wall surfaces are acceptable to receive the specified guard systems. Do not begin installation until acceptable conditions have been corrected.

3.02 INSTALLATION

- A. Install Corner Guards securely to wall according to manufacturer=s instructions and recommendations.
- B. Install Corner Guards accurately in location, alignment, and elevation.
- C. Install Corner Guards full height of door opening or wall opening, unless indicated otherwise. If desired by the Architect in the field, field cut units to lesser height within openings.

3.03 ADJUST AND CLEAN

- A. Remove surplus materials, rubbish, and debris resulting from corner guard installation upon completion of work, and leave areas of installation in neat, clean condition.
- B. Clean corner guards and adjacent wall surfaces of all stains and marks.

SUBMITTAL CHECK LIST

- 1. Product Data.
- 2. Samples.

END OF SECTION 10260

SECTION 10440 - INTERIOR SIGNS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Interior signage as indicated on the Drawings and specified herein, including:
1. Non-illuminated room identification signs.
  2. Non-illuminated directional and information signs.
  3. Non-illuminated dimensional lettering.

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.
  3. Submit a CAD generated location plan noting the location of all signage and cross referenced to message schedule or plots for architect's approval.
- 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: "Takeform", Fusion.
  2. Includes sign type elevations "A"- "G" as shown on drawing.
- B. Type of Graphics:
1. Sign face shall be 0.035" (nominal) standard grade, high-pressure surface laminate.
  2. The sign shall incorporate balanced construction with the core sandwiched between laminates to

- prevent warping. Laminate on the sign face only shall not be acceptable.
- 3. Raised etched tactile letters welded to front surface of plaque.
- 4. Letters and numerals shall also be included in raised braille, color same as background.
- 5. Copy to be centered, unless indicated otherwise.
- 6. Signs are to be unframed.
- 7. Typeface: Uppercase 3/4" high; unless otherwise noted on drawing.
- 8. Font: As selected from manufacturer's entire standard selection.
- 9. Square corners.
- 10. The laminates (front and back) shall be pressure laminated and precision machined together to a 90-degree angle. Edges shall be smooth, void of chips, burrs, sharp edges and marks.

## 2.02 ROOM IDENTIFICATION SIGNS

### A. In-House Updatable Flat Wall Signs:

- 1. Basis of Specifications: "Takeform", Fusion.
- 2. Includes sign type elevation "H" as shown on drawing.

### B. Type of Graphics (permanent graphic panel):

- 1. Sign face shall be 0.035" (nominal) standard grade, high-pressure surface laminate.
- 2. Insert components shall have a .080 thickness non-glare acrylic window and shall be inlaid flush to sign face for a smooth, seamless appearance.
- 3. Sign shall include modules allowing for inserts, notice holders, occupancy sliders. All modules shall be flush to sign face for a smooth, seamless appearance.
- 4. Signs are to be unframed.
- 5. Square corners.
- 6. The laminates (front and back) shall be pressure laminated and precision machined together to a 90-degree angle. Edges shall be smooth, void of chips, burrs, sharp edges and marks.

### C. Accessories:

- 1. Provide template software in both Mac and Windows formats.
- 2. Provide a template containing layout, font, color, artwork and trim lines to allow Owner to produce inserts on laser or ink jet printer.

## 2.03 ROOM IDENTIFICATION SIGNS

### A. Flat Wall Signs With Backer:

- 1. Basis of Specifications: "Takeform", Fusion.
- 2. Includes sign type elevations "J" and "K" as shown on drawing.

### B. Type of Graphics (permanent graphic panel):

- 1. Sign face shall be 0.035" (nominal) standard grade, high-pressure surface laminate
- 2. The sign shall incorporate balanced construction with the core sandwiched between laminates to prevent warping. Laminate on the sign face only shall not be acceptable.
- 3. Raised etched tactile letters welded to front surface of plaque.
- 4. Letters and numerals shall also be included in raised braille, color same as background.
- 5. Copy to be centered, unless indicated otherwise.
- 6. Signs are to be unframed.
- 7. Typeface: Uppercase 3/4" high; unless otherwise noted on drawing.
- 8. Font: As selected from manufacturer's entire standard selection.
- 9. Square corners.
- 10. The laminates (front and back) shall be pressure laminated and precision machined together to a 90-degree angle. Edges shall be smooth, void of chips, burrs, sharp edges and marks.
- 11. Sign shall include modules allowing for inserts, notice holders, occupancy sliders. All modules shall be flush to sign face for a smooth, seamless appearance



2.04 ROOM IDENTIFICATION SIGNS

- A. Suspended Double Sided Overhead Signs
  - 1. Basis of Specifications: "Takeform", Fusion.
  - 2. Includes sign type elevations "I" as shown on drawing.
  
- B. Type of Graphics (permanent graphic panel):
  - 1. Sign face shall be 0.035" (nominal) standard grade, high-pressure surface laminate
  - 2. The sign shall incorporate balanced construction with the core sandwiched between laminates to prevent warping. Laminate on the sign face only shall not be acceptable.
  - 3. Raised etched tactile letters welded to front and back surface of plaque.
  - 4. Copy to be centered, unless indicated otherwise.
  - 5. Signs are to be unframed.
  - 6. Typeface: Uppercase 4" high; unless otherwise noted on drawing.
  - 7. Font: As selected from manufacturer's entire standard selection.
  - 8. Square corners.
  - 9. The laminates (front and back) shall be pressure laminated and precision machined together to a 90-degree angle. Edges shall be smooth, void of chips, burrs, sharp edges and marks.
  - 10. Sign shall include modules allowing for inserts, notice holders, occupancy sliders. All modules shall be flush to sign face for a smooth, seamless appearance
  
- C. Accessories:
  - 1. Provide Anodized metal hardware and cable system for suspending. Finish should be Natural.

2.05 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.

2.06 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. Typical sign elevations may be indicated on Drawings. See miscellaneous details on Drawings.

2.07 SIGN SCHEDULE (ROOM IDENTIFICATION SIGNS)

A. Sign Type: A

Location: Adjacent to Vestibule 101, Lobby/Reading 106 (qty: 2), Vestibule 118, Adult Collection, Stack Area 116, Y/A Collection Stack Area 127, Corridor 107, Corridor 128

Text: As shown on elevations

Sign Type: B

Location: Adjacent to Corridor 107, Office 109, Lounge 111, Mech. 112, MGR Office 113, Support 115, Office 114, Storage 105, Utility 121 (qty:2)

Text: As shown on elevations

Sign Type: C

Location: Adjacent to Corridor 107, Utility 121

Text: As shown on elevations

Sign Type: D

Location: Adjacent to Family Restroom 119

Text: As shown on elevations

Sign Type: E

Location: Adjacent to Women 120, Women 103

Text: As shown on elevations

Sign Type: F

Location: Adjacent to Men 102

Text: As shown on elevations

Sign Type: G

Location: Adjacent to Restroom 110

Text: As shown on elevations

Sign Type: H

Location: TBD (mounted on end panel of shelving units) Quantity: (2) per end panel for a total of 62.

Text: As shown on elevations

Sign Type: I

Location: TBD (suspended from ceiling) Quantity: 6

Text: As shown on elevations

Sign Type: J

Location: Adjacent to Study 124, Study 125, Study 126

Text: As shown on elevations

Sign Type: K

Location: Adjacent to Meeting Room 129, Program Room 130, Meeting Room 123

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.
- 5. CAD location plan.

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 Academic 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.

- B. Samples:

1. Submit samples showing manufacturer's full range of standard colors for each type.

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 one of the following approved manufacturers:

1. "DeBourgh"
2. "List Industries", "Superior"
3. "Lyon"
4. "Penco"
5. "Republic"
6. "ASI"
7. "AJW"

- B. Type and Size:

1. Basis of Specification:
  - a. "Penco"; "Guardian Standard Lockers".
  - b. "Superior"; "Marquis Student".
2. Width x depth x height as indicated on Drawings.  
If not indicated, provide 12" wide x 12" deep x 72" high, 2-tier.

- C. Doors:
  - 1. 16 gauge steel, one piece, flanged 4 edges.
  - 2. Perimeter ventilation.
  
- D. Frame:
  - 1. 16 gauge steel angle, tee, or channel.
  
- E. Panels:
  - 1. Sides: 18 gauge sheet steel box ends.
  - 2. Backs: 26 gauge sheet steel.
  - 3. Dividers: 26 gauge sheet steel.
  
- F. Continuous Sloped Top:
  - 1. 24 gauge steel, flanged edges.
  
- G. Base:
  - 1. "Zee" type, 4" height.
  - 2. 12 gauge steel.
  
- H. Shelves:
  - 1. 24 gauge steel.
  - 2. Flanged four (4) sides.
  
- I. Bottoms:
  - 1. 24 gauge galvanized steel minimum.
  
- J. Hooks:
  - 1. 3 total, 1 located on each side and back.
  - 2. Provide at each opening location.
  
- L. Hinges:
  - 1. 5 knuckle, recessed.
  - 2. 3 on single tier lockers, 2 on box type lockers.
  - 3. Provide at each opening location.
  
- M. Silencer:
  - 1. Air cushion rubber bumpers.
  - 2. 3 on single tier lockers, 2 on box type lockers.
  - 3. Provide at each opening location.
  
- N. Number Plate:
  - 1. Riveted.
  - 2. Numbered in sequence.
  - 3. Provide at each opening location.
  
- O. Locking Device:
  - 1. Built-in recessed stainless steel hasp area for removable padlock.
  - 2. Provide at each opening location.
  
- P. Finish:
  - 1. Baked epoxy enamel.
  - 2. Color as indicated on drawings, or as selected from manufacturer's entire selection.

Q. Handicapped Accessible Lockers:

1. Provide at locations as indicated on the Drawings or if not indicated, provide a minimum of 5% but not less than one of each type specified.
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. Install lockers in accordance with manufacturer's instructions and shop drawings.
- B. Provide all anchor bolts and other fasteners as required.
- C. Provide manufacturer's standard trim at bottom and sides.
- D. 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, cutsheets, 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.
- B. Fire Extinguisher Cabinets:
  - 1. Use with Dry Chemical Type Extinguishers (Semi-Recessed Mounted):
    - a. Basis of Specification: "JL Industries, Inc." Crownline Fire-FX2.
    - 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.
    - g. Fire-rating: UL labeled - One hour.

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 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 10650 – OPERABLE PARTITIONS

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. Manually operated, individual panel operable partitions.

B. Related Sections include the following:

1. Division 3 Sections for concrete tolerances required.

2. Division 5 Sections for primary structural support, including pre-punching of support members by structural steel supplier per operable partition supplier's template.

3. Division 6 Sections for wood framing and supports, and all blocking at head and jambs as required.

4. Division 9 Sections for wall and ceiling framing at head and jambs.

1.03 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified in writing by the operable partition manufacturer, as qualified to install the manufacturer's partition systems for work similar in material, design, and extent to that indicated for this Project.

B. Acoustical Performance: Test operable partitions in an independent acoustical laboratory in accordance with ASTM E90 test procedure to attain no less than the STC rating specified. Provide a complete and unedited written test report by the testing laboratory upon request.

C. Preparation of the opening shall conform to the criteria set forth per ASTM E557 "Standard Practice for Architectural Application and Installation of Operable Partitions."

1.04 SUBMITTALS

A. Product Data: Material descriptions, construction details, finishes, installation details, and operating instructions for each type of operable partition, component, and accessory specified.

B. Shop Drawings: Show location and extent of operable partitions. Include plans, sections, details, attachments to other construction, and accessories. Indicate dimensions, weights, conditions at openings, and at storage areas, and required installation, storage, and operating clearances. Indicate location and installation requirements for hardware and track, including floor tolerances required and direction of travel. Indicate blocking to be provided by others.

C. Setting Drawings: Show imbedded items and cutouts required in other work, including support beam punching template.

D. Samples: Color samples demonstrating full range of finishes available by architect. Verification samples will be available in same thickness and material indicated for the work.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Clearly mark packages and panels with numbering systems used on Shop Drawings. Do not use permanent markings on panels.

B. Protect panels during delivery, storage, and handling to comply with manufacturer's direction and as required to prevent damage.

OPERABLE PARTITIONS

1.06 WARRANTY

- A. Provide written warranty by manufacturer of operable partitions agreeing to repair or replace any components with manufacturing defects.
- B. Partition Warranty period: Two (2) years from date of shipment.
- C. Suspension System Warranty: Five (5) years from date of shipment.

PART 2 - PRODUCTS

2.01 MANUFACTURERS, PRODUCTS, AND OPERATIONS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Modernfold, Inc. or equal.
- B. Products: Subject to compliance with the requirements, provide the following product:
  - 1. OP-01: Acousti-Seal #931 manually operated individual panel operable partition.

2.02 OPERATION

- A. OP-01: Acousti-Seal #931: Series of individual flat panels, manually operated, top supported with operable floor seals.
- B. Final Closure:
  - 1. OP-01: Horizontally expanding panel edge with removable crank

2.03 PANEL CONSTRUCTION

- A. Nominal 3-inch (76mm) thick panels in manufacturer's standard 48-inch (1220mm) widths. All panel horizontal and vertical framing members fabricated from minimum 18-gage formed steel with overlapped and welded corners for rigidity. Top channel is reinforced to support suspension system components. Frame is designed so that full vertical edges of panels are of formed steel and provide concealed protection of the edges of the panel skin.
- B. Panel skin shall be:
  - 1. OP-01: 0.50-inch (13mm) tackable 100% recycled gypsum board, class "A" rated single material or composite layers continuously bonded to panel frame. Acoustical ratings of panels with this construction minimum:
    - a. 50 STC
- C. Hinges for Closure Panels, Pass Doors, and Pocket Doors shall be:
  - 1. OP-01: Full leaf butt hinges, attached directly to the panel frame with welded hinge anchor plates within panel to further support hinge mounting to frame. Lifetime warranty on hinges. Hinges mounted into panel edge or vertical astragal are not acceptable.
- D. Panel Trim: No vertical or horizontal trim required or allowed on edges of panels; minimal groove appearance at all panel joints.
- E. Panel Weights:
  - 1. OP-01: 50 STC - 8 lbs./square foot

2.04 PANEL FINISH

- A. Panel finish shall be:
  - 1. OP-01: Reinforced vinyl with woven backing weighing not less than 21 ounces (595 grams) per lineal yard.

B. Panel Trim: Exposed panel trim of one consistent color:

1. OP-01: To Be Advised

2.05 SOUND SEALS

A. Vertical Interlocking Sound Seals between panels: Roll-formed steel astragals, with reversible tongue and groove configuration in each panel edge for universal panel operation. Rigid plastic astragals or astragals in only one panel edge are not acceptable.

B. Horizontal Top Seals: Continuous contact extruded vinyl bulb shape with pairs of non-contacting vinyl fingers to prevent distortion without the need for mechanically operated parts.

C. Horizontal bottom floor seals shall be:

1. OP-01: Modernfold IA2 Bottom seal. Automatic operable seals providing nominal 2-inch (51mm) operating clearance with an operating range of +0.50-inch (13mm) to -1.50-inch (38mm) which automatically drop as panels are positioned, without the need for tools or cranks.

2.60 SUSPENSION SYSTEM

A. OP-01: #17 Suspension System - "Smart Track™"

1. Suspension Tracks: Minimum 11-gauge, 0.12-inch (3.04mm) roll-formed steel track, suitable for either direct mounting to a wood header or supported by adjustable steel hanger brackets, supporting the load-bearing surface of the track, connected to structural support by pairs of 0.38-inch (10mm) diameter threaded rods. Aluminum track is not acceptable.
  - a. Exposed track soffit: Steel, integral to track, and pre-painted off-white.
2. Carriers: Two all-steel trolleys with steel tired ball bearing wheels. Non-steel tires are not acceptable. Suspension system shall provide automatic indexing of panels into stack area using preprogrammed switches and trolleys without electrical, pneumatic, or mechanical activation.

2.07 REQUIRED ACCESSORIES

A. Accessories:

1. OP-01: No. 1 Matching pass door same thickness and appearance as the panels provide 3'-0" x 7'-0". ADA compliant pass door to be trimless and equipped with friction latch and flush pulls for panic operation. No threshold will be permitted.
2. OP-01: No 2 Matching pass door same thickness and appearance as the panels provide 3'-0" x 7'-0".. ADA compliant pass door to be trimless and equipped with friction latch and flush pulls for panic operation. No threshold will be permitted.
3. OP-01: Self-Illuminated exit signs. (Both sides of walls)
4. OP-01: Panic Hardware. (Both sides of walls)
5. OP-01: Pocket Doors: Acousti-Seal Pocket Doors by Modernfold, Inc., with same construction, finish, and appearance as the adjacent panels.
  - a. Pocket Door configuration shall be manually operated:  
Type IV bi-fold door hinged to a jamb on one side as required.
6. Work Surfaces: (Both sides of walls)
  - a. Dry marker surfaces, white enamel on steel, bonded to the face of panel, with trim without exposed fasteners. Trim is not acceptable on vertical edges to provide uninterrupted work surfaces.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Comply with ASTM E557, operable partition manufacturer's written installation instructions, Drawings and approved Shop Drawings.
- B. Install operable partitions and accessories after other finishing operations, including painting have been completed.
- C. Match operable partitions by installing panels from marked packages in numbered sequence indicated on Shop Drawings.
- D. Broken, cracked, chipped, deformed or unmatched panels are not acceptable.

3.02 CLEANING AND PROTECTION

- A. Clean partition surfaces upon completing installation of operable partitions to remove dust, dirt, adhesives, and other foreign materials according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions in a manner acceptable to the manufacturer and installer that insure operable partitions are without damage or deterioration at time of Substantial Completion.

3.03 ADJUSTING

- A. Adjust operable partitions to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and other moving parts.

3.04 EXAMINATION

- A. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable partitions. Proceed with installation only after unsatisfactory conditions have been corrected.

3.05 DEMONSTRATION

- A. Demonstrate proper operation and maintenance procedures to Owner's representative.
- B. Provide Operation and Maintenance Manual to Owner's representative.

END OF SECTION

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 SUBMITTALS

- A. Manufacturer's Literature:
  - 1. Submit manufacturer's "cut sheets" for each item specified, showing installation details, and product information.

1.03 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. Paper Towel Dispensers (C-Fold Type):
1. "Bobrick" B-4262, "Contura" Series.
  2. Surface-mounted, stainless steel, satin finish, lockable.
  3. Provide at locations as shown on Drawings, or if not shown, provide one per restroom and one per every sink.
- E. Diaper Changing Stations:
1. "Bobrick" KB-200-01 (Grey).
  2. Surface-mounted, high-impact polyethylene with foam core, concealed fasteners.
  3. Provide at locations as shown on Drawings, or if not shown, provide one per restroom.

### 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 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. Dual-Roller Window Shades, with a screen fabric shade and an interior blackout fabric shade.

1.02 SUBMITTALS

- A. Window Shades Schedule:
  - 1. Indicate locations, quantities and field measurements of dimensions for all window shades.
  - 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. Mounting hardware, headbox, fascia, chain and clutch operator – Twenty-five (25) years.
- B. Shade Fabric – Ten (10) years.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide products, as approved by the Architect, from one of the following approved manufacturers:
  - 1. "Hunter Douglas Contract"
  - 2. "Draper"
  - 3. "MechoSystems"

2.02 DUAL-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, dual vertical roll-up, fabric window shades with bead chain and clutch operating mechanism.



2. One roller with screen fabric shade.
  3. One roller with interior blackout fabric shade.
- C. Mounting Style:
1. Inside of window opening and extending from head to sill and jamb to joint.
- D. Room Darkening Side and Sill Channels:
1. Rear, interior blackout shade only.
  2. 2-chambers; one for fabric and fabric retainer, and the other for fabric guide/channel locator.
  3. Extruded aluminum with polybond edge seals and SnapLoc-mounting brackets and with concealed fastening. Exposed fastening is not acceptable. Channels shall accept one-piece exposed blackout hembar with vinyl seal to assure side light control and sill light control.
- E. 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.
- F. Fascia:
1. L-shaped aluminum extrusion to conceal shade roller and hardware.
  2. Finish: Baked enamel.
- G. Color:
1. As indicated on the Drawings, or if not indicated, to be selected by Architect from manufacturer's entire selection.

#### 2.04 SCREEN FABRIC

- A. Basis of Specification: "GreenScreen" Evolve GEQS39 by Mermet
- B. Description:
1. Interior sun control, 100% recyclable, PVC free polyester fabric in diamond knit pattern.
- C. Attributes:
1. Weight: 5.69 ounces per square yard
  2. Thickness: .023 inches
  3. Roll Width: 118 inches
  4. Openness: 10 percent
  5. Color: Cloud.
  6. Class A Fire Rating
  7. Bacteria and fungal resistant.

2.05 INTERIOR BLACKOUT FABRIC

- A. Basis of Specification: "Avila Twilight" Blackout AT-0101
- B. Description:
  - 1. Interior sun control, 100% polyester with acrylic foam blackout coating.
- C. Attributes:
  - 1. Weight: 14.5 ounces per square yard
  - 2. Thickness: .020 inches
  - 3. Roll Width: 118 inches
  - 4. Openness: 0 percent
  - 5. Class A Fire Rating
  - 6. Bacteria and fungal resistant.
- D. Color:
  - 1. Interior and Exterior: Pewter.

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.
- A. Provide clearance between sash and shades to permit unencumbered operation of sash hardware.
- B. Install the fascia, closure panels and end caps with to conceal roller and operating mechanisms. Exposed fasteners are unacceptable.
- D. Isolate metal parts from concrete and mortar to prevent galvanic action.
- E. 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 12522 – UPHOLSTERED SEATING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. This section includes movable furniture as scheduled herein, to include:
1. Upholstered built-in seating.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 06400 – Architectural Woodwork

1.03 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. Provide upholstered furniture which complies with California Technical Bulletin No. 117.
  2. Upholstered furniture foam components must meet or exceed ASTM D-3574 Standard Test Method for Flexible Cellular Materials.
  3. All components must meet or exceed all applicable national standards for furniture safety and durability, including but not limited to the following:
    - a. ANSI/BIFMA X5.1

1.04 WARRANTY

- A. Warranty covers deterioration of finishes and other materials beyond normal wear.  
B. Warranty Period: Not less than ten (10) years from Date of Substantial Completion

1.05 SUBMITTALS

- A. Schedule:
1. Indicate locations, quantities and field measurements of dimensions for all built-in upholstered seating.
  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.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Upholstery:
1. Type: As shown on Drawings.
  2. Pattern: As shown on Drawings.
  3. Color: As shown on Drawings.
  4. Comply with NFPA-260 Class 1 and CA Bulletin 117.
- B. Foam: 3" Medium-density foam that meets CA Bulletin 117.

2.02 FABRICATION

- A. Prior to fabrication, field verify actual dimensions by accurate site measurements.
- B. Seat and back are foamed and upholstered individually.
- C. All seams shall be reinforced, utilizing heavy duty, commercial quality thread of fiber compatible with upholstery fiber compositions.
- D. All horizontal planes shall be parallel and level for full extent, and at 90 degrees with vertical planes for full extent of all intersections.
- E. Foam shall be cut to crown at seams so that a consistent level at all horizontal and vertical planes is maintained upon foam compression with use.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install new upholstered seat cushion and back on existing built-in benches for permanent installation using concealed hardware.
- B. Install upholstered seat cushion and back on new built-in bench for permanent installation using fully concealed hardware.

SUBMITTAL CHECK LIST

- 1. Schedule.
- 2. Product Data.
- 3. Samples.

END OF SECTION 12522

SECTION 13850 - FIRE DETECTION AND ALARM SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. This specification describes partial replacement and expansion of the existing fire detection and alarm system. Contractor to replace existing fire alarm control panel to allow for system expansion. Contractor to replace existing visual devices and audio/visual devices to meet current code requirements. The intent is for all other existing components and wiring to remain (provided they are compatible with the new fire alarm control panel).
- 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 when complete 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 of a single manufacturer, engaged in the manufacturing and sale of 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. This section includes providing a complete and operative fire alarm system in the project as indicated on the drawings, specified herein and elsewhere required.
- B. System shall consist of control 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.
- C. System shall be actuated by any automatic or manual initiating device 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.

- D. 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.
- E. 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. Control unit shall at a minimum provide all functions currently available from existing control panel and be in full compliance with the requirements of NFPA 72.  
Enclosing cabinet shall be red in color.
- B. Control panel shall be furnished with minimum point capacity as required per device quantities indicated on Drawings. Initiating devices shall be any combination of smokes, pull stations, heat detectors, duct detectors, control modules or monitor modules.

### 2.03 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.

### 2.04 MANUAL ALARM STATIONS

- A. 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.
- B. Provide twenty-five (25) spare glass rods at control panel location.



2.05 VISUAL ALARM DEVICES

- A. 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.

2.06 AUDIBLE/VISIBLE ALARM DEVICES

- A. 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.

2.07 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.

#### 2.08 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.

#### 2.09 ELECTROMAGNETIC DOOR HOLDERS

- A. Description:
  - 1. Shall be furnished for door(s) as indicated on the drawings.
  - 2. Provide type as indicated on the drawings. Where not indicated, provide wall-mounted units. If specific condition does not permit wall-mounted units, consult Architect for ability to use floor-mounted units.
  - 3. Wall-Mounted units shall be surface mount and shall include semi-flush magnet, cover assembly, catch plate, matching electrical box housing, and surface-mount box.
  - 4. Floor-Mounted units shall include magnet(s), catch plate(s), housing, mounting plate, gasket, and mounting hardware.
  - 5. Provide back plate on opposite side of hollow doors, for reinforcing catch plate.
  - 6. Provide chrome catch plate extender rod as required for length and reach needed.
- B. Provide wall and floor mounted magnetic door holders for single or double doors as indicated on the drawings. Coordinate the type and location with the door manufacturer's shop drawings and field installer.
- C. Door holders shall be constructed of brushed stainless steel with a long-life electromagnet designed to release the doors when smoke or heat is detected by a local detector. Door closer will be provided in another section of these specifications. Doors may be manually opened and closed at any time.
- D. Door holders shall be powered from the control panel.

#### 2.10 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 gymnasiums, 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 the existing fire alarm components as indicated on the Drawings.
- B. Contractor shall coordinate the work so that the Fire Alarm System is in full operation while building is occupied by the public.
- C. Should it become necessary to make the existing Fire Alarm System 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.

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 the automatic dialer to the telephone terminal board.
- D. From the fire alarm control panel, provide a connection to each electromagnetic door holder.

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."

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.

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.
- 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
  2. Roof Top Units
- 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

SECTION 15002 – BASIC MECHANICAL MATERIALS AND METHODS

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 basic mechanical materials and methods to complement other Division 15 Sections.
1. Piping materials and installation instructions common to most piping systems.
  2. Concrete base construction requirements.
  3. Escutcheons.
  4. Dielectric fittings.
  5. Flexible connectors.
  6. Mechanical sleeve seals.
  7. Meters and Gages.
  8. Thermometers.
  9. Motors.
  10. Equipment nameplate data requirements.
  11. Labeling and identifying mechanical systems and equipment
  12. Nonshrink grout for equipment installations.
  13. Field-fabricated metal and wood equipment supports.
  14. Installation requirements common to equipment specification sections.
  15. Mechanical demolition.
  16. Cutting and patching.
  17. Touchup painting and finishing.
- B. Pipe and pipe fitting materials are specified in Division 15 Hydronic Piping.

1.03 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, 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 duct shafts.
- 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 plastic materials:
1. ABS: Acrylonitrile-butadiene-styrene plastic.
  2. CPVC: Chlorinated polyvinyl chloride plastic.

3. NP: Nylon plastic.
4. PE: Polyethylene plastic.
5. PVC: Polyvinyl chloride plastic.

- G. The following are industry abbreviations for rubber materials:
1. CR: Chlorosulfonated polyethylene synthetic rubber.
  2. EPDM: Ethylene propylene diene terpolymer rubber.

1.04 SUBMITTALS

- A. Product Data: For dielectric fittings, flexible connectors, mechanical sleeve seals, and identification materials and devices.
- B. Shop Drawings: Detail fabrication and installation for metal and wood supports and anchorage for mechanical materials and equipment.
- C. Samples: Of color, lettering style, and other graphic representation required for each identification material and device.

1.05 QUALITY ASSURANCE

- A. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.
- B. Equipment Selection: Equipment of higher electrical characteristics, physical dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. Additional costs shall be approved in advance by appropriate Contract Modification for these increases. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning 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 prevent entrance of dirt, debris, and moisture.
- B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.
- C. Protect flanges, fittings, and piping specialties from moisture and dirt.
- D. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.07 SEQUENCING AND SCHEDULING

- A. Coordinate mechanical equipment installation with other building components.
- B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.
- C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.

- D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.
- E. 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.
- F. Coordinate requirements for access panels and doors if mechanical items requiring access are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "Access Doors."
- G. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and similar concealment.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- 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. Dielectric Unions:
    - a. Capitol Manufacturing Co.
    - b. Central Plastics Co.
    - c. Eclipse, Inc.; Rockford-Eclipse Div.
    - d. Epco Sales Inc.
    - e. Hart Industries International, Inc.
    - f. Watts Industries, Inc.; Water Products Div.
    - g. Zurn Industries, Inc.; Wilkins Div.
  - 2. Dielectric Flanges:
    - a. Capitol Manufacturing Co.
    - b. Central Plastics Co.
    - c. Epco Sales Inc.
    - d. Watts Industries, Inc.; Water Products Div.
  - 3. Dielectric-Flange Insulating Kits:
    - a. Calpico, Inc.
    - b. Central Plastics Co.
  - 4. Dielectric Couplings:
    - a. Calpico, Inc.
    - b. Lochinvar Corp.
  - 5. Dielectric Nipples:
    - a. Grinnell Corp.; Grinnell Supply Sales Co.
    - b. Perfection Corp.
    - c. Victaulic Co. of America.
  - 6. Metal, Flexible Connectors:
    - a. ANAMET Industrial, Inc.

- b. Central Sprink, Inc.
- c. Flexicraft Industries.
- d. Flex-Weld, Inc.
- e. Grinnell Corp.; Grinnell Supply Sales Co.
- f. Hyspan Precision Products, Inc.
- g. McWane, Inc.; Tyler Pipe; Gustin-Bacon Div.
- h. Mercer Rubber Co.
- i. Metraflex Co.
- j. Proco Products, Inc.
- k. Uniflex, Inc.

- 7. Rubber, Flexible Connectors:
  - a. General Rubber Corp.
  - b. Mercer Rubber Co.
  - c. Metraflex Co.
  - d. Proco Products, Inc.
  - e. Red Valve Co., Inc.
  - f. Uniflex, Inc.

- 8. Mechanical Sleeve Seals:
  - a. Calpico, Inc.
  - b. Metraflex Co.
  - c. Thunderline/Link-Seal.

- 9. Meters and Gages:
  - a. Miljoco
  - b. AMETEC
  - c. Ernst
  - d. Trerice
  - e. Weiss

- 10. Thermometers:
  - a. Weiss

- 11. Identifying Devices and Labels
  - a. Seton Name Plate Corporation
  - b. Brady Co., Signmark Division
  - c. Industrias Safety Supply Co.
  - d. Allen Systems, Inc.

2.02 PIPE AND PIPE FITTINGS

- A. Refer to individual Division 15 piping Sections for pipe 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 (3.2-mm) 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 (3.2 mm) 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. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- E. Solder Filler Metals: ASTM B 32.
1. Alloy Sn95 or Alloy Sn94: Approximately 95 percent tin and 5 percent silver, with 0.10 percent lead content.
  2. Alloy E: Approximately 95 percent tin and 5 percent copper, with 0.10 percent maximum lead content.
  3. Alloy HA: Tin-antimony-silver-copper zinc, with 0.10 percent maximum lead content.
  4. Alloy HB: Tin-antimony-silver-copper nickel, with 0.10 percent maximum lead content.
  5. Alloy Sb5: 95 percent tin and 5 percent antimony, with 0.20 percent maximum lead content.
- F. Brazing Filler Metals: AWS A5.8.
1. BCuP Series: Copper-phosphorus alloys.
  2. BAg1: Silver alloy.
- G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- H. Solvent Cements: Manufacturer's standard solvent cements for the following:
1. ABS Piping: ASTM D 2235.
  2. CPVC Piping: ASTM F 493.
  3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
  4. PVC to ABS Piping Transition: ASTM D 3138.
- I. Plastic Pipe Seals: ASTM F 477, elastomeric gasket.
- J. Flanged, Ductile-Iron Pipe Gasket, Bolts, and Nuts: AWWA C110, rubber gasket, carbon-steel bolts and nuts.
- K. Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.
1. Sleeve: ASTM A 126, Class B, gray iron.
  2. Followers: ASTM A 47 (ASTM A 47M) malleable iron or ASTM A 536 ductile iron.
  3. Gaskets: Rubber.
  4. Bolts and Nuts: AWWA C111.
  5. Finish: Enamel paint.

2.04 DIELECTRIC FITTINGS

- A. General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.
- B. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.
- C. Insulating Material: Suitable for system fluid, pressure, and temperature.
- D. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).
- E. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.
- F. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
  - 1. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.
- G. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).
- H. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

2.05 FLEXIBLE CONNECTORS

- A. General: Fabricated from materials suitable for system fluid and that will provide flexible pipe connections. Include 125-psig (860-kPa) minimum working-pressure rating, unless higher working pressure is indicated, and ends according to the following:
  - 1. 2-Inch NPS (DN50) and Smaller: Threaded.
  - 2. 2-1/2-Inch NPS (DN65) and Larger: Flanged.
  - 3. Option for 2-1/2-Inch NPS (DN65) and Larger: Grooved for use with keyed couplings.
- B. Bronze-Hose, Flexible Connectors: Corrugated, bronze, inner tubing covered with bronze wire braid. Include copper-tube ends or bronze flanged ends, braze welded to hose.
- C. Stainless-Steel-Hose/Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include steel nipples or flanges, welded to hose. Not acceptable for potable water.
- D. Stainless-Steel-Hose/Stainless-Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include stainless-steel nipples or flanges, welded to hose. Not acceptable for potable water.



2.06 MECHANICAL SLEEVE SEALS

- A. Description: Modular design, with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve. Include connecting bolts and pressure plates.

2.07 PIPING SPECIALTIES

- A. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:
1. Steel Sheet Metal: 0.0239-inch (0.6-mm) minimum thickness, galvanized, round tube closed with welded longitudinal joint.
  2. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, galvanized, plain ends.
  3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
  4. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
- B. Escutcheons: Manufactured wall, ceiling, and floor plates; deep-pattern type if required to conceal protruding fittings and sleeves.
1. ID: Closely fit around pipe, tube, and insulation of insulated piping.
  2. OD: Completely cover opening.
  3. Cast Brass: One piece, with set screw.
    - a. Finish: Polished chrome-plate.
  4. Cast Brass: Split casting, with concealed hinge and set screw.
    - a. Finish: Polished chrome-plate.
  5. Stamped Steel: Split plate, with exposed-rivet hinge, spring clips, and chrome-plated finish.
  6. Cast-Iron Floor Plate: One-piece casting.

2.08 THERMOMETERS

- A. Scale Range: Temperature ranges for services listed are as follows:
1. All: -30 to 300 deg F, with degree scale divisions (0 to 115 deg C, with 1-degree scale divisions).
- B. Accuracy: Plus or minus 1 percent of range span or plus or minus one scale division to maximum of 1.5 percent of range span.
- C. Light Powered Thermometer.
1. Description: Light-powered digital thermometer, with 3/8" high digital readout. Glass passivated thermistor sensing element with internal recalibration potentiometer.
  2. Case: high impact ABS.
  3. Adjustment Joint: 180 degree adjustment in vertical plane, 360 degree adjustment in horizontal plane, with locking device.
- D. Separable Sockets (Thermowells).
1. Description: Fitting with protective socket for installation in threaded pipe fitting to hold fixed thermometer stem.
    - a. Material: Brass, for use in copper piping.
    - b. Material: Stainless steel, for use in steel piping.
    - c. Extension-Neck Length: Nominal thickness of 2 inches (50 mm), but not less than thickness of insulation. Omit extension neck for sockets for piping not insulated. Insertion Length: To extend 2 inches (50 mm) into pipe.

2.09 PRESSURE GAGES

- A. Description: ASME B40.1, phosphor-bronze bourdon-tube type with bottom connection; dry type, unless liquid-filled-case type is indicated. Case: Drawn steel, brass, or aluminum with 4-1/2-inch-(115-mm-) diameter, glass lens.
- B. Connector: Brass, NPS 1/4(DN8).
- C. Scale: White-coated aluminum with permanently etched markings.
- D. Accuracy: Grade B, plus or minus 2 percent of middle 50 percent of scale.
- E. Range: Comply with the following:
  - 1. Vacuum: 30 inches Hg of vacuum to 15 psig of pressure (100 kPa of vacuum to 103 kPa of pressure).
  - 2. Fluids under Pressure: Two times the normal operating pressure.
- F. Valves and Cocks: 1/4 NPS brass or stainless steel needle type.
- G. Snubbers: ASME B40.5, where required.

2.10 IDENTIFYING DEVICES AND LABELS

- A. General: Manufacturer's standard products of categories and types required for each application as referenced in other Division 15 Sections. If more than one type is specified for application, selection is Installer's option, but provide one selection for each product category.
- B. Equipment Nameplates: Metal nameplate with operational data engraved or stamped; permanently fastened to equipment.
  - 1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data.
  - 2. Location: Accessible and visible location.
- C. Snap-on Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap on, color-coded, complying with ASME A13.1.
- D. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, permanent adhesive, color-coded, pressure-sensitive vinyl, complying with ASME A13.1.
- E. Plastic Duct Markers: Manufacturer's standard color-coded, laminated plastic. Comply with the following color code:
  - 1. Green: Cold air.
  - 2. Yellow: Hot air.
  - 3. Yellow/Green or Green: Supply air.
  - 4. Blue: Exhaust, outside, return, and mixed air.
  - 5. For hazardous exhausts, use colors and designs recommended by ASME A13.1.
  - 6. Nomenclature: Include the following:
    - a. Direction of airflow.
    - b. Duct service.
    - c. Duct origin.
    - d. Duct destination.
    - e. Design cubic feet per meter (liters per second).

- F. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated.
  - 1. Fabricate in sizes required for message.
  - 2. Engraved with engraver's standard letter style, of sizes and with wording to match equipment identification.
  - 3. Punch for mechanical fastening.
  - 4. Thickness: 1/16 inch (1.6 mm), for units up to 20 sq. in. (130 sq. cm) or 8 inches (200 mm) long; 1/8 inch (3.2 mm) for larger units.
  - 5. Fasteners: Self-tapping stainless-steel screws or contact-type permanent adhesive.
  
- G. Plastic Equipment Markers: Color-coded, laminated plastic. Comply with the following color code:
  - 1. Green: Cooling equipment and components.
  - 2. Yellow: Heating equipment and components.
  - 3. Yellow/Green: Combination cooling and heating equipment and components.
  - 4. Brown: Energy reclamation equipment and components.
  - 5. Blue: Equipment and components that do not meet any criteria above.
  - 6. For hazardous equipment, use colors and designs recommended by ASME A13.1.
  - 7. Nomenclature: Include the following, matching terminology on schedules as closely as possible:
    - a. Name and plan number.
    - b. Equipment service.
    - c. Design capacity.
    - d. Other design parameters such as pressure drop, entering and leaving conditions, and rpm.
  
  - 8. Size: Approximate 2-1/2 by 4 inches (65 by 100 mm) for control devices, dampers, and valves; and 4-1/2 by 6 inches (115 by 150 mm) for equipment.
  
- H. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification, with corresponding designations indicated. Use numbers, lettering, and wording indicated for proper identification and operation/maintenance of mechanical systems and equipment.
  - 1. Multiple Systems: If multiple systems of same generic name are indicated, provide identification that indicates individual system number and service such as "Boiler No. 3," "Air Supply No. 1H," or "Standpipe F12."
  
- I. Detectable Locating Tape: For buried lines, provide 3" wide by full length yellow detectable marking tape, with wording similar to: "Caution: Buried Line Below. (State Service)."

## 2.11 GROUT

- A. Nonshrink, Nonmetallic Grout: ASTM C 1107, Grade B.
  - 1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, non-staining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
  - 2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
  - 3. Packaging: Premixed and factory packaged.

## PART 3 - EXECUTION

3.01 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. General: Install piping as described below, unless piping Sections specify otherwise. Individual Division 15 piping Sections specify unique piping installation requirements.
- B. General Locations and Arrangements: 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 at indicated slope.
- D. Install components with pressure rating equal to or greater than system operating pressure.
- E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.
- F. Install piping free of sags and bends.
- G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.
- H. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.
- I. Install piping to allow application of insulation plus 1-inch (25-mm) clearance around insulation.
- J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- K. Install fittings for changes in direction and branch connections.
- L. Install couplings according to manufacturer's written instructions.
- M. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wall board partitions, and suspended ceilings according to the following:
  - 1. Chrome-Plated Piping: Cast brass, one piece, with set screw, and polished chrome-plated finish. Use split-casting escutcheons if required, for existing piping.
  - 2. Uninsulated Piping Wall Escutcheons: Cast brass or stamped steel, with set screw.
  - 3. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
  - 4. Insulated Piping: Cast brass or stamped steel; with concealed hinge, spring clips, and chrome-plated finish.
  - 5. Piping in Utility Areas: Cast brass or stamped steel, with set-screw or spring clips.
- N. Sleeves are not required for core drilled holes.
- O. Permanent sleeves are not required for holes formed by PE removable sleeves.
- P. Install sleeves for pipes passing through concrete and masonry walls, and concrete floor and roof slabs.

- Q. 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 (50 mm) above finished floor level.
  2. Build sleeves into new walls and slabs as work progresses.
  3. Install sleeves large enough to provide annular clear space between sleeve and pipe or pipe insulation for installation of firestopping where required but in no case less than 1/4 inch. Use the following sleeve materials:
    - a. Steel Pipe Sleeves: For pipes smaller than 6-inch NPS (DN150).
    - b. Steel, Sheet-Metal Sleeves: For pipes 6-inch NPS (DN150) 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 nonshrink, nonmetallic grout.
  4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants or firestopping where required.
  5. Use Type S, Grade NS, Class 25, Use O, neutral-curing silicone sealant, unless otherwise indicated.
- R. Aboveground, Exterior-Wall, Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeve for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Install steel pipe for sleeves smaller than 6 inches (150 mm) in diameter.
  2. Install cast-iron "wall pipes" for sleeves 6 inches (150 mm) in diameter and larger.
  3. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.
- S. Underground, Exterior-Wall, Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Size sleeve for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.
- T. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestopping materials. Refer to Division 15 Section "Firestopping" for materials.
- U. Verify final equipment locations for roughing-in.
- V. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

- W. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:
1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
  2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
  3. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube"; or CDA's "Copper Tube Handbook."
  4. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
  5. 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:
    - a. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
    - b. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
    - c. Align threads at point of assembly.
    - d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
    - e. 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.
  6. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.
  7. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.
  8. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join pipe and fittings according to the following:
    - a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
    - b. ABS Piping: ASTM D 2235 and ASTM D 2661.
    - c. CPVC Piping: ASTM D 2846 and ASTM F 493.
    - d. PVC Pressure Piping: ASTM D 2672.
    - e. PVC Nonpressure Piping: ASTM D 2855.
    - f. PVC to ABS Nonpressure Transition Fittings: Procedure and solvent cement according to ASTM D 3138.
  9. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657 procedures and manufacturer's written instructions.
    - a. Plain-End Pipe and Fittings: Use butt fusion.
    - b. Plain-End Pipe and Socket Fittings: Use socket fusion.
- X. Piping Connections: Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping 2-inch NPS (DN50) and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS (DN50) or smaller threaded pipe connection.
2. Install flanges, in piping 2-1/2-inch NPS (DN65) and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.
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.

### 3.02 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to provide maximum possible headroom, if mounting heights are not indicated.
- B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Architect.
- C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- D. Install mechanical 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.
- E. Install equipment giving right of way to piping installed at required slope.
- F. Install flexible connectors on equipment side of shutoff valves, horizontally and parallel to equipment shafts if possible.

### 3.03 LABELING AND IDENTIFYING

- A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
  1. Plastic markers, with application systems. Install on insulation segment if required for hot, uninsulated piping.
  2. Locate pipe markers as follows if piping is exposed in finished spaces, machine rooms, and accessible maintenance spaces, such as shafts, tunnels, plenums, and exterior nonconcealed locations:
- B. Near each valve and control device.
- C. Near each branch, excluding short takeoffs for fixtures and terminal units. Mark each pipe at branch, if flow pattern is not obvious.
- D. Near locations if pipes pass through walls, floors, ceilings, or enter nonaccessible enclosures.
- E. At access doors, manholes, and similar access points that permit view of concealed piping.
- F. Near major equipment items and other points of origination and termination.

- G. Spaced at maximum of 50-foot (15-m) intervals along each run. Reduce intervals to 25 feet (7.5 m) in congested areas of piping and equipment.
  - H. On piping above removable acoustical ceilings, except omit intermediately spaced markers.
  - I. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of mechanical equipment preferably on the motor starter or disconnect switch.
    - 1. Lettering Size: Minimum 1/4-inch- (6.4-mm-) high lettering for name of unit if viewing distance is less than 24 inches (610 mm), 1/2-inch- (12.7-mm-) high lettering for distances up to 72 inches (1800 mm), and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.
    - 2. Text of Signs: Provide name of identified unit. Include text to distinguish between multiple units, inform user of electrical panel and circuit number.
  - J. Duct Systems: Identify air supply, return, exhaust, intake, and relief ducts with duct markers; or provide stenciled signs and arrows, showing duct system service and direction of flow.
    - 1. Location: In each space, if ducts are exposed or concealed by removable ceiling system, locate signs near points where ducts enter into space and at maximum intervals of 50 feet (15 m).
  - K. Adjusting: Relocate identifying devices as necessary for unobstructed view in finished construction.
  - L. Buried Lines: Provide detectable warning tape, to be placed 8" below surface and 8" above pipe, two levels of tape required.
- 3.04 ERECTION OF METAL SUPPORTS AND ANCHORAGE
- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.
  - B. Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."
- 3.05 ERECTION OF WOOD SUPPORTS AND ANCHORAGE
- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage to support and anchor mechanical 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.
- 3.06 DEMOLITION
- A. Disconnect, demolish, and remove Work specified in Division 15 Sections.
  - B. If pipe, ductwork, insulation, or equipment to remain is damaged or disturbed, remove damaged portions and install new products of equal capacity and quality.
  - C. Accessible Work: Remove indicated exposed pipe and ductwork in its entirety.



- D. Work Abandoned in Place: Cut and remove underground pipe a minimum of 2 inches (50 mm) beyond face of adjacent construction. Cap and patch surface to match existing finish.
- E. Removal: Remove indicated equipment from Project site.
- F. Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational equipment indicated for relocation.

3.07 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair cut surfaces to match adjacent surfaces.

3.08 GROUTING

- A. Install nonmetallic, non-shrink, grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's written instructions.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placing of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases to provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout according to manufacturer's written instructions.

END OF SECTION 15500

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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. Sleeves.
  - 5. Escutcheons.
  - 6. Grout.
  - 7. Plumbing demolition.
  - 8. Equipment installation requirements common to equipment sections.
  - 9. Painting and finishing.
  - 10. Supports and anchorages.
  - 11. 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.

1.04 SUBMITTALS

- A. Product Data: For the following:
  - 1. Transition fittings.
  - 2. Dielectric fittings.
  - 3. 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 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 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.

- G. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

2.07 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.

2.08 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.

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. However, firestopping is required. See Division 07 of the specifications.
- N. Permanent sleeves are not required for holes formed by removable PE sleeves.
- O. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
- P. 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.
- Q. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
- R. Verify final equipment locations for roughing-in.
- S. 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.

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 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.

3.05 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.

3.06 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.
- 3.07 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.
- 3.08 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.
- 3.09 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.
- 3.10 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 utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.11 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:
  - 1. Under building slabs, use engineered fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.12 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.

3.13 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.

3.14 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
San waste inside above floor & storm water above floor	PVC Schedule 40 DWV	Primed , solvent weld
San waste inside below floor & storm water below floor	Cast Iron (SV) HSor NH	Gasketed, NH coupled
	PVC Schedule 40 DWV	Primed , solvent weld
Domestic Water Supply above floor	Type "L" copper	Soldered
ACU Cond. Drain	Type "M" Copper	Soldered

END OF SECTION 15010

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SECTION 15060 – HANGERS AND SUPPORTS

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 hangers and supports for mechanical system piping and equipment.

1.03 DEFINITIONS

- A. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry.
- B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.04 PERFORMANCE REQUIREMENTS

- A. Design channel support systems for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
- B. Design heavy-duty steel trapezes for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

1.05 SUBMITTALS

- A. Product Data: For each type of pipe hanger, channel support system component, and thermal-hanger shield insert indicated.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- 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. Pipe Hangers:
    - a. AAA Technology and Specialties Co., Inc.
    - b. B-Line Systems, Inc.
    - c. Carpenter & Patterson, Inc.
    - d. Empire Tool & Manufacturing Co., Inc.
    - e. Globe Pipe Hanger Products, Inc.
    - f. Grinnell Corp.
    - g. GS Metals Corp.
    - h. Michigan Hanger Co., Inc.
    - i. National Pipe Hanger Corp.
    - j. PHD Manufacturing Co.
    - k. PHS Industries, Inc.
    - l. Piping Technology & Products, Inc.
    - m. Tolco Pipe Hanger and Support Systems
  - 2. Channel Support Systems:
    - a. B-Line Systems, Inc.
    - b. Grinnell Corp.; Power-Strut Unit.
    - c. GS Metals Corp.

- d. Michigan Hanger Co., Inc.; O-Strut Div.
  - e. National Pipe Hanger Corp.
  - f. Thomas & Betts Corp.
  - g. Unistrut Corp.
  - h. Wesanco, Inc.
  - i. Tolco Pipe Hanger and Support Systems
3. Thermal-Hanger Shield Inserts:
- a. Carpenter & Patterson, Inc.
  - b. Michigan Hanger Co., Inc.
  - c. PHS Industries, Inc.
  - d. Pipe Shields, Inc.
  - e. Rilco Manufacturing Co., Inc.
  - f. Value Engineered Products, Inc.
  - g. Tolco Pipe hanger and Support Systems
4. Powder-Actuated Fastener Systems:
- a. Gunnebo Fastening Corp.
  - b. Hilti, Inc.
  - c. ITW Ramset/Red Head.
  - d. Masterset Fastening Systems, Inc.2

## 2.02 MANUFACTURED UNITS

- A. Pipe Hangers, Supports, and Components: MSS SP-58, factory-fabricated components. Refer to "Hanger and Support Applications" Article in Part 3 for where to use specific hanger and support types.
- 1. Galvanized, Metallic Coatings: For piping and equipment that will not have field-applied finish.
  - 2. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- B. Channel Support Systems: MFMA-2, factory-fabricated components for field assembly.
- 1. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.
  - 2. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- C. Thermal-Hanger Shield Inserts: 100-psi (690-kPa) minimum compressive-strength insulation, encased in sheet metal shield.
- 1. Material for Cold Piping: ASTM C 552, Type I cellular glass or water-repellent-treated, ASTM C 533, Type 1 calcium silicate with vapor barrier.
  - 2. Material for Hot Piping: ASTM C 552, Type I cellular glass or water-repellent-treated, ASTM C 533, Type I calcium silicate.
  - 3. For Trapeze or Clamped System: Insert and shield cover entire circumference of pipe.
  - 4. For Clevis or Band Hanger: Insert and shield cover lower 180 degrees of pipe.
  - 5. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

## 2.03 MISCELLANEOUS MATERIALS

- A. Powder-Actuated Drive-Pin Fasteners: Powder-actuated-type, drive-pin attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.



- B. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.
- C. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.

### PART 3 - EXECUTION

#### 3.01 HANGER AND SUPPORT APPLICATIONS

- A. Specific hanger requirements are specified in Sections specifying equipment and systems.
- B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.
- C. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections:
  - 1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30 (DN15 to DN750).
  - 2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F (49 to 232 deg C) pipes, NPS 4 to NPS 16 (DN100 to DN400), requiring up to 4 inches (100 mm) of insulation.
  - 3. U-Bolts (MSS Type 24): For support of heavy pipe, NPS 1/2 to NPS 30 (DN15 to DN750).
- D. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
  - 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20 (DN20 to DN500).
  - 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20 (DN20 to DN500), if longer ends are required for riser clamps.
  - 3. For lines carrying domestic cold water or chilled water, install a 1/4" thick thermal break between pipe and clamp.
- E. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
  - 1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
  - 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
  - 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
- F. Building Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
  - 1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
  - 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joint construction to attach to top flange of structural shape.
  - 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
  - 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.

5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
  6. C-Clamps (MSS Type 23): For structural shapes. Purlin clamps only shall be acceptable for use on formed Z purlins or girts.
  7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
  8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
  9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
  10. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    - a. Light (MSS Type 31): 750 lb (340 kg).
    - b. Medium (MSS Type 32): 1500 lb (675 kg).
    - c. Heavy (MSS Type 33): 3000 lb (1350 kg).
- G. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
  2. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.

### 3.02 HANGER AND SUPPORT INSTALLATION

- A. Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Channel Support System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled channel systems.
1. Field assemble and install according to manufacturer's written instructions.
- C. Heavy-Duty Steel Trapeze Installation: Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated, heavy-duty trapezes.
1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
  2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D-1.1.
- D. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- E. Install powder-actuated drive-pin fasteners in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
- F. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

- G. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- I. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- J. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.
- K. Insulated Piping: Comply with the following:
  - 1. Attach clamps and spacers to piping.
    - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    - c. Do not exceed pipe stress limits according to ASME B31.9.
  - 2. Install MSS SP-58, Type 39 protection saddles, if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
    - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN100) and larger if pipe is installed on rollers.
  - 3. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall span arc of 180 degrees.
    - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN100) and larger if pipe is installed on rollers.
  - 4. Shield Dimensions for Pipe: Not less than the following:
    - a. NPS 1/4 to NPS 3-1/2 (DN8 to DN90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
    - b. NPS 4 (DN100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
    - c. NPS 5 and NPS 6 (DN125 and DN150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
    - d. NPS 8 to NPS 14 (DN200 to DN350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.
    - e. NPS 16 to NPS 24 (DN400 to DN600): 24 inches (610 mm) long and 0.105 inch (2.67 mm) thick.
  - 5. Pipes NPS 8 (DN200) and Larger: Include wood inserts.
  - 6. Insert Material: Length at least as long as protective shield.
  - 7. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.03 INSTALLATION OF HANGERS AND SUPPORTS

- A. General: Install hangers, supports, clamps and attachments to support piping properly from building structure; comply with MSS SP-69 and SP-89. Arrange for grouping of parallel runs of horizontal piping supported together on field-fabricated, heavy-duty trapeze hangers where possible. Install supports with maximum spacings complying with MSS SP-69. Where piping of various sizes is supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe as specified above for individual pipe hangers.

<u>PIPE SIZE</u>	<u>MAX. HANGER SPACING</u>	<u>HANGER DIAMETER</u>
1/2 to 1-1/4 inch	6'-6"	3/8"
1-1/2 to 2 inch	10'-0"	3/8"
2-1/2 to 3 inch	10'-0"	1/2"
4 to 6 inch	10'-0"	5/8"
8 to 12 inch	14'-0"	7/8"
PVC (All sizes)	6'-0"	3/8"

- B. Grooved Pipe Systems: Grooved pipe systems, such as "Victaulic" shall be supported at hanger spacings recommended by the manufacturer, but in no case farther apart than this chart.

3.04 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure above or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make smooth bearing surface.

3.05 METAL FABRICATION

- A. Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
  1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  2. Obtain fusion without undercut or overlap.
  3. Remove welding flux immediately.
  4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.06 ADJUSTING

- A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.07 PAINTING

- A. Touching Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).
- B. Touching Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9 Section "Painting."
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 15060

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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.

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/ft<sup>3</sup>
    - b. Maximum Service Temperature: 660° F rating.
    - c. K Factor: 0.25 Btu.in/(hr.ft<sup>2</sup>.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/ft<sup>3</sup>
    - b. Maximum Service Temperature: 200°F
    - c. K-Factor: 0.276 but-in.hr.ft<sup>2</sup>.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



**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 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:
Roof Drain piping and roof drain sumps body	FE	1"		Yes			
Domestic Cold Water < 2"	FE or MFPP	1"		Yes			
2 1/2" and larger	FE or MFPP	1-1/2"		Yes			
Domestic Hot Water < 2"	MFPP	1"		Yes			
2 1/2" and larger	FE or MFPP	1-1/2"		Yes			

MFPP = mineral fiber pre-formed pipe insulation; FE = flexible elastomeric

END OF SECTION 15082

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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 DEFINITIONS

- A. ASJ: All-service jacket.
- B. FSK: Foil, scrim, kraft paper.
- C. FSP: Foil, scrim, polyethylene
- D. PVDC: Polyvinylidene chloride
- E. SSL: Self-sealing lap

1.04 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.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the U.S. Department of Labor, Bureau of Apprenticeship and Training.
- B. 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 ½ lb/ft<sup>3</sup>.
    - a. Maximum Service Temperature: 650 °F rating
    - b. K Factor: 0.25 Btu.in/(hr.ft<sup>2</sup>.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/ft<sup>3</sup>
    - b. Maximum Service Temperature: 220°F
    - c. K-Factor: 0.276 Btu-in./hr.ft<sup>2</sup>.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/ft<sup>3</sup>.
    - b. Maximum Service Temperature: 250° F.
    - c. K-Factor: 0.26 Btu-in./(hr.ft<sup>2</sup>. 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/ft<sup>3</sup>.
  - b. Maximum Service Temperature 450°F.
  - c. K-Factor: 0.24 Btu-in./(hr.ft<sup>2</sup>.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 EQUIPMENT INSULATION MATERIALS

A. Mineral-Fiber Rigid Board Insulation:

1. Description: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB for pipe and tank applications. Provide insulation with factory-applied FSK jacket.
2. Material Properties:
  - a. Density: Minimum 6.0 lb/ft<sup>3</sup>.
  - b. Maximum Service Temperature 450° F.
  - c. K-Factor: 0.24 Btu-in./(hr. ft<sup>2</sup> 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.  
Owens Corning; Fiberglass 700 Series.

2.06 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: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I. Minimum 2 inch long longitudinal laps and butt strips.

2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. PVDC Jacket for Indoor Applications: 4-mil- (0.10-mm-) thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perms (0.013 metric perms) when tested according to ASTM E 96 and with a flame-spread index of 5 and a smoke-developed index of 20 when tested according to ASTM E 84.
4. PVDC-SSL Jacket: PVDC jacket with a self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip.
  - a. Products:
    - 1) Dow Chemical Company (The); Saran 540 Vapor Retarder Film and Saran 560 Vapor Retarder Film.

## 2.07 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.
  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 PENETRATIONS

- A. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
  1. Seal penetrations with flashing sealant.
  2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
  3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm).
  4. Seal jacket to wall flashing with flashing sealant.
- B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- C. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions. Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches (50 mm).
  1. Firestopping and fire-resistive joint sealers are specified in Division 7 Section "Through-Penetration Firestop Systems."
- D. Insulation Installation at Floor Penetrations:
  1. Duct: Install insulation continuously through floor penetrations that are not fire rated. For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches (50 mm).
  2. Pipe: Install insulation continuously through floor penetrations.

### 3.05 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.

3.06 DUCT SYSTEM APPLICATIONS

- A. Insulation materials and thickness are specified in schedules at the end of this Section.

3.07 INDOOR EQUIPMENT, TANK, AND VESSEL INSULATION INSTALLATION

- A. Flexible Elastomeric Thermal Insulation Installation for Tanks, Vessels, and Pumps: Install insulation over entire surface.
  - 1. Apply 100 percent coverage of adhesive to surface with manufacturer's recommended adhesive.
  - 2. Seal longitudinal seams and end joints.

3.08 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.

3.09 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.

3.10 FINISHES

- A. Duct, Equipment, and Pipe Insulation with ASJ or other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 9 painting Sections.
  - 1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
    - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
- C. Color: white
- D. Do not field paint aluminum, stainless-steel, or PVC jackets.

3.11 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:
Concealed supply air duct	MFBInk	1"	2"	Yes	1	No	
Dual wall duct		none					
Return ducts		none					
Exposed supply air duct							(3)
Exterior Ducts	FE	2"	2"	Yes	1		(4)
Abbreviations:							
MFBInk: Mineral Fiber Blanket							
MFBrd: Mineral Fiber Board							
IL: Internally lined							
FE: flexible elastomeric							
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.) Coat with UV resistant paint, color to be white							

3.12 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. HVAC and Plumbing Pipe Insulation Schedule:

Item	Type	Thick-ness	Thickness in attics & all un-Conditioned Spaces	Vapor Retarder Required?	Number of Layers	Field Applied Jacket	Notes:
						(2)	
Condensate and Equipment Drain Water Below 60 Deg. F (ACR)	FE	1/2"		Yes	1		
Roof Drains including drain sumps	FE	1"		Yes			
Domestic Cold Water < 2"	FE or MFPPPI	1"		Yes			
2 1/2" and larger	"	1-1/2"		Yes			
Domestic Hot Water < 2"	MFPPPI	1"		Yes			
2 1/2" and larger	"	1-1/2"		Yes			

MFPPPI = mineral fiber pre-formed pipe insulation; FE + flexible elastomeric;

Notes: 1. Combined thickness shall result in requirement shown. 2. PVC jacket on all lines within 6 Ft of floors and work surfaces and all exposed lines in gyms. 3. Weatherproof jacket or UV resistant paint on FE.

END OF SECTION 15815

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SECTION 15085 – IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

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. Section Includes:
  - 1. Pipe labels.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.

1.04 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.01 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
  - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
  - 2. Lettering Size: At least 1-1/2 inches high.
- E. Piping shall have the following colors on decals located at 50'-0" on center for quick identification. Colors are selected from Pittsburgh Paints' numbers and are used only to establish typical colors:

<u>PIPING</u>	<u>COLOR /PATTERN</u>	
Cold Water – Domestic	Focal Blue	23-77
Hot Water – Domestic	Focal Yellow	23-78
Storm Water	White	

Refer to NFPA 99 or ANSI A13.1 for other standard markings and colors.

### PART 3 - EXECUTION

#### 3.01 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

#### 3.02 PIPE LABEL INSTALLATION

- A. Piping Color-Coding: Painting of piping is specified in Division 09 Section "Painting."
- B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
1. Near each valve and control device.
  2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
  3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
  4. At access doors, manholes, and similar access points that permit view of concealed piping.
  5. Near major equipment items and other points of origination and termination.
  6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
- C. Pipe Label Color Schedule:
1. Domestic Water Piping:
    - a. Background Color: White.
    - b. Letter Color: Blue.
  2. Storm Drainage Piping:
    - a. Background Color: Black.
    - b. Letter Color: White.

END OF SECTION 15085



SECTION 15110 – GENERAL DUTY VALVES

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 general duty valves common to several mechanical and plumbing piping systems.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Special purpose valves are specified in Division 15 piping system Sections.
  - 2. Valve tags and charts are specified in Division 15 Section 15100 "General Mechanical Requirements."

1.03 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each valve type. Include body material, valve design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions. Include list indicating valve and its application.
- C. Maintenance data for valves to include in the operation and maintenance manual specified in Division 1. Include detailed manufacturer's instructions on adjusting, servicing, disassembling, and repairing.

1.04 QUALITY ASSURANCE

- A. Single-Source Responsibility: Comply with the requirements specified in Division 1 Section "Materials and Equipment," under "Source Limitations" Paragraph.
- B. ASME Compliance: Comply with ASME B31.9 for building services piping and ASME B31.1 for power piping.
- C. MSS Compliance: Comply with the various MSS Standard Practice documents referenced.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
  - 1. Protect internal parts against rust and corrosion.
  - 2. Protect threads, flange faces, grooves, and weld ends.
  - 3. Set ball and plug valves open to minimize exposure of functional surfaces.
  - 4. Set butterfly valves closed or slightly open.
  - 5. Block check-valves in either closed or open position.
- B. Use the following precautions during storage:
  - 1. Maintain valve end protection.



2. Store indoors and maintain valve temperature higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
- C. Use a sling to handle large valves. Rig to avoid damage to exposed parts. Do not use hand-wheels and stems as lifting or rigging points.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Ball Valves:
    - a. Hammond Valve Corporation.
    - b. Milwaukee Valve Company, Inc.
    - c. NIBCO Inc.
    - d. Stockham Valves & Fittings, Inc.
    - e. Victaulic Company of America.
  2. Butterfly Valves:
    - a. Crane Company; Valves and Fitting Division.
    - b. Grinnell Corp.
    - c. Hammond Valve Corporation.
    - d. Keystone Valve USA, Inc.
    - e. Milwaukee Valve Company, Inc.
    - f. NIBCO Inc.
    - g. Stockham Valves & Fittings, Inc.
    - h. Victaulic Company of America.
  3. Swing Check Valves:
    - a. Crane Company; Valves and Fitting Division.
    - b. Hammond Valve Corporation.
    - c. Milwaukee Valve Company, Inc.
    - d. NIBCO Inc.
    - e. Stockham Valves & Fittings, Inc.
    - f. Victaulic Company of America.
  4. Wafer Check Valves:
    - a. Hammond Valve Corporation.
    - b. Keystone Valve USA, Inc.
    - c. Milwaukee Valve Company, Inc.
    - d. NIBCO Inc.
    - e. Stockham Valves & Fittings, Inc.
    - f. Victaulic Company of America.
  5. Plug Valve
    - a. Crane
    - b. Stockham

GENERAL DUTY VALVES

15110 - 2

2.02 BASIC, COMMON FEATURES

- A. Design: Rising stem or rising outside screw and yoke stems, except as specified below.
  - 1. Non-rising stem valves may be used only where headroom prevents full extension of rising stems.
- B. Pressure and Temperature Ratings: As indicated in the "Application Schedule" of Part 3 of this Section and as required to suit system pressures and temperatures.
- C. Sizes: Same size as upstream pipe, unless otherwise indicated.
- D. Operators: Use specified operators and hand-wheels, except provide the following special operator features:
  - 1. Hand-wheels: For valves other than quarter turn.
  - 2. Lever Handles: For quarter-turn valves 6 inches (DN150) and smaller, except for plug valves, which shall have square heads. Furnish Owner with 1 wrench for every 10 plug valves.
  - 3. Chain-Wheel Operators: For valves 4 inches (DN100) and larger, installed 96 inches (2400 mm) or higher above finished floor elevation.
  - 4. Gear-Drive Operators: For quarter-turn valves 8 inches (DN200) and larger.
- E. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.
- F. Bypass and Drain Connections: Comply with MSS SP-45 bypass and drain connections.
- G. Threads: ASME B1.20.1.
- H. Flanges: ASME B16.1 for cast iron, ASME B16.5 for steel, and ASME B16.24 for bronze valves.
- I. Solder Joint: ASME B16.18.
  - 1. Caution: Where soldered end connections are used, use solder having a melting point below 840 deg F (450 deg C) for gate, globe, and check valves; below 421 deg F (216 deg C) for ball valves.

2.03 BALL VALVES

- A. Ball Valves, 4 Inches (DN100) and Smaller: MSS SP-110, Class 150, 600-psi (4140-kPa) CWP, ASTM B 584 bronze body and bonnet, 2-piece construction; chrome-plated brass ball, full port for 1/2-inch valves and larger; blowout proof; bronze or brass stem; teflon seats and seals; threaded or soldered end connections:
  - 1. Operator: Vinyl-covered steel lever handle.
  - 2. Stem Extension: For valves installed in insulated piping.

2.04 BUTTERFLY VALVES

- A. Butterfly Valves: MSS SP-67, 200-psi (1380-kPa) CWP, 150-psi (1035- kPa) maximum pressure differential, ASTM A 126 cast-iron body and bonnet, extended neck, stainless-

steel stem, field-replaceable EPDM or Buna N sleeve and stem seals, wafer, lug, or grooved style:

1. Disc Type: Nickel-plated ductile iron.
2. Operator for Sizes 2 Inches (DN50) to 6 Inches (DN150): Lever handle with latch lock.
3. Operator for Sizes 8 Inches (DN200) to 24 Inches (DN600): Gear operator with position indicator.
4. Operator for Sizes 8 Inches (DN200) and Larger, 96 Inches (2400 mm) or Higher above Floor: Chain-wheel operator.
5. Stem extension for valves installed in insulated piping.

#### 2.05 CHECK VALVES

- A. Swing Check Valves, 2-1/2 Inches (DN65) and Smaller: MSS SP-80; Class 125, 200-psi (1380-kPa) CWP, or Class 150, 300-psi (2070-kPa) CWP; horizontal swing, Y-pattern, ASTM B 62 cast-bronze body and cap, rotating bronze disc with rubber seat or composition seat, threaded or soldered end connections:
- B. Swing Check Valves, 3 Inches (DN80) and Larger: MSS SP-71, Class 125, 200-psi (1380-kPa) CWP, ASTM A 126 cast-iron body and bolted cap, horizontal-swing bronze disc, flanged or grooved end connections.
- C. Wafer Check Valves: Class 125, 200-psi (1380-kPa) CWP, ASTM A 126 cast-iron body, bronze disc/plates, stainless-steel pins and springs, Buna N seals, installed between flanges.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance of valves. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- C. Operate valves from fully open to fully closed positions. Examine guides and seats made accessible by such operation.
- D. Examine threads on valve and mating pipe for form and cleanliness.
- E. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Check gasket material for proper size, material composition suitable for service, and freedom from defects and damage.
- F. Do not attempt to repair defective valves; replace with new valves.

#### 3.02 INSTALLATION

- A. Install valves as indicated, according to manufacturer's written instructions.

- B. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate the general arrangement of piping, fittings, and specialties.
- C. Install valves with unions or flanges at each piece of equipment arranged to allow servicing, maintenance, and equipment removal without system shutdown.
- D. Locate valves for easy access and provide separate support where necessary.
- E. Install valves in horizontal piping with stem at or above the center of the pipe.
- F. Install valves in a position to allow full stem movement.
- G. For chain-wheel operators, extend chains to 60 inches (1500 mm) above finished floor elevation.
- H. Installation of Check Valves: Install for proper direction of flow as follows:
  - 1. Swing Check Valves: Horizontal position with hinge pin level.
  - 2. Wafer Check Valves: Horizontal or vertical position, between flanges.

### 3.03 SOLDERED CONNECTIONS

- A. Cut tube square and to exact lengths.
- B. Clean end of tube to depth of valve socket with steel wool, sand cloth, or a steel wire brush to a bright finish. Clean valve socket.
- C. Apply proper soldering flux in an even coat to inside of valve socket and outside of tube.
- D. Open gate and globe valves to fully open position.
- E. Remove the cap and disc holder of swing check valves having composition discs.
- F. Insert tube into valve socket, making sure the end rests against the shoulder inside valve. Rotate tube or valve slightly to ensure even distribution of the flux.
- G. Apply heat evenly to outside of valve around joint until solder melts on contact. Feed solder until it completely fills the joint around tube. Avoid hot spots or overheating valve. Once the solder starts cooling, remove excess amounts around the joint with a cloth or brush.

### 3.04 THREADED CONNECTIONS

- A. Note the internal length of threads in valve ends and proximity of valve internal seat or wall to determine how far pipe should be threaded into valve.
- B. Align threads at point of assembly.
- C. Apply appropriate tape or thread compound to the external pipe threads, except where dry seal threading is specified.
- D. Assemble joint, wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

3.05 FLANGED CONNECTIONS

- A. Align flange surfaces parallel.
- B. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.
- C. For dead-end service, butterfly valves require flanges both upstream and downstream for proper shutoff and retention.

3.06 VALVE END SELECTION

- A. Select valves with the following ends or types of pipe/tube connections:
  - 1. Copper Tube Size, 2-1/2 Inches (DN65) and Smaller: Solder ends, except option of threaded ends for heating hot water service.
  - 2. Steel Pipe Sizes, 3 Inches (DN80) and Larger: Grooved end or flanged.

3.07 APPLICATION SCHEDULE

- A. General Application: Use gate, ball, and butterfly valves for shutoff duty; globe, ball, and butterfly for throttling duty. Refer to piping system Specification Sections for specific valve applications and arrangements.
- B. Domestic Water Systems: Use the following valve types:
  - 1. Ball Valves: Class 150, 600-psi (4140-kPa) CWP, with stem extension.
  - 2. Butterfly Valves: Nickel-plated ductile iron, iron disc; EPDM or Buna N sleeve and stem seals.
  - 3. Bronze Swing Check: Class 125, with rubber seat.
- C. Heating Water Systems: Use the following valve types:
  - 1. Ball Valves: Class 150, 600-psi (4140-kPa) CWP, with stem extension and memory stop.
  - 2. Butterfly Valves: Nickel-plated ductile iron, aluminum bronze, or epoxy-coated ductile iron disc; EPDM or Buna N sleeve and stem seals.
  - 3. Bronze Swing Check: Class 150, with composition seat.
  - 4. Check Valves: Iron swing, wafer, or lift type, as indicated. Swing check shall be Class 150 with bronze seat ring.
- D. Chilled-Water and Dual Temperature Systems: Use the following valve types:
  - 1. Ball Valves: Class 150, 600-psi (4140-kPa) CWP, with stem extension.
  - 2. Butterfly Valves: Full lugged (wafer style not acceptable). Nickel-plated ductile iron, iron disc; EPDM sleeve and stem seals.
  - 3. Check Valves: Class 125, bronze body swing check with composite seat; Class 125, cast-iron body swing check; Class 125, cast-iron body wafer check; or Class 125, cast-iron body lift check.

3.08 ADJUSTING

- A. Adjust or replace packing after piping systems have been tested and put into service, but before final adjusting and balancing. Replace valves if leak persists.

END OF SECTION 15110

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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.
- B. Related Sections include the following:
  - 1. Division 07 Section "Through-Penetration Fire Stopping Systems" for materials and methods for sealing pipe penetrations through fire and smoke barriers.
  - 2. Division 07 Section "Joint Sealers" for materials and methods for sealing pipe penetrations through exterior walls.

1.02 SUMMARY

- A. This Section includes domestic water piping inside the building.
- B. Related Sections include the following:
  - 1. Division 15 Section "Plumbing Specialties" for water distribution piping specialties.

1.03 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing domestic water piping systems with 100 psig, unless otherwise indicated.

1.04 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.

1.05 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. Refer to Part 3 "Pipe and Fitting Applications" Article for applications of pipe, tube, fitting, and joining materials.
- B. 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. Hard Copper Tube: ASTM B 88, Type L, 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.

2.04 VALVES

- A. Bronze, general-duty valves are specified in Division 15 Section "General Duty Valves."
- B. Balancing and drain valves are specified in Division 15 Section "Piping Specialties."

PART 3 - EXECUTION

3.01 EXCAVATION

- A. Excavating, trenching, and backfilling are specified in Division 02 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. Flanges may be used on aboveground piping, unless otherwise indicated.
- C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.
- D. Aboveground Domestic Water Piping: Use the following piping materials for each size range:
1. NPS 1 (DN 25) and Smaller: Hard copper tube, Type L; copper pressure fittings; and soldered joints.
  2. NPS 1-1/4 and NPS 1-1/2 (DN 32 and DN 40): Hard copper tube, Type L; copper pressure fittings; and soldered joints.
  3. NPS 2 (DN 50): Hard copper tube, Type L (Type B); 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 (DN 50) and smaller. Use cast-iron butterfly with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
  2. Throttling Duty: Use bronze ball for piping NPS 2 (DN 50) and smaller. Use cast-iron butterfly valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
  3. Hot-Water-Piping, Balancing Duty: Memory-stop balancing valves.
  4. Drain Duty: Hose-end drain valves.
- B. 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 toilet rooms. Use ball valves for piping NPS 2 (DN 50) and smaller. Use butterfly valves for piping NPS 2-1/2 (DN 65) and larger.



- C. Install calibrated balancing valves in each hot-water circulation return branch. Set calibrated balancing valves as indicated on drawings. Calibrated balancing valves are specified in Division 15 Section "Domestic Water Piping Specialties."

3.04 PIPING INSTALLATION

- A. Basic piping installation requirements are specified in Division 15 Section "Basic Mechanical Materials and Methods."
- B. Install under-building-slab copper tubing according to CDA's "Copper Tube Handbook."
- C. Install domestic water piping level and plumb and square.

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. Threaded Joints: Teflon tape. Pipe dope is not allowed.
- D. 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 second dimple for visual inspection, and braze branch tube into collar.
- E. Compression-Type Crimped Connectors: 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.
- F. Acceptable Manufacturers:
  - 1. Nibco.
  - 2. Viega.
  - 3. Xpress Elkhart Products Corporation. (Outboard bead design).

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 (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
- B. Install supports according to Indiana Plumbing Code.
- 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 (10 mm).
- E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS ¾ (DN 20) and Smaller: 60 inches (DN 1500) with 3/8-inch (10 mm) rod.
2. NPS 1 (DN 25) and NPS 1-1/4 (DN 32): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.
3. NPS 1-1/2 (DN 40) and NPS 2 (DN 50): 96 inches (26.24 meters) with 3/8-inch (10-mm) rod.

F. Install supports for vertical copper tubing not to exceed every 10 feet (3.048 meters).

### 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 water-service piping with shutoff valve, and extend and connect to the following:
  1. 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."
  2. 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 (DN 65) 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:
    - 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 125 psig (863 kPa) above operating pressure, without exceeding pressure rating of piping system materials.

Isolate test source and allow to stand for 24 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. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
    - a. Adjust calibrated balancing valves to flows indicated.
  4. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.
  5. Remove and clean strainer screens. Close drain valves and replace drain plugs.
  6. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.10 CLEANING

- A. Clean and disinfect potable and non-potable domestic water piping as follows:
1. Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired 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 (50 mg/L) 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 (200 mg/L) 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.
- B. Prepare and submit reports of purging and disinfecting activities.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION 15140

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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 "Plumbing Specialties" for soil, waste, and vent piping systems specialties.
  - 3. Division 07 Section "Through-Penetration Fire Stopping Systems" for materials and Methods for sealing pipe penetrations through fire and smoke barriers.
  - 4. 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 CAST-IRON SOIL PIPING

- A. Hub-and-Spigot Pipe and Fittings: ASTM A 74 Latest edition.

1. Manufacturers:
  - a. AB & I
  - b. Charlotte
  - c. Tyler
2. Joints: ASTM C 564, rubber compression gasket.
3. American made and tested with "CI" branded on pipe and fittings.

2.03 COPPER TUBE AND FITTINGS

- A. Copper DWV Tube: Drain, Waste and Vent: ASTM B 306, drainage tube, drawn temper.
  1. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.

2.04 PVC PIPE AND FITTINGS

- A. PVC Pipe: ASTM D 2665, Socket Type, Schedule 40, PVC DWV pattern.
- B. Drainage Fittings: ACTMD 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. Belowground, Soil, Waste, and Vent Piping: All Sizes:
  1. PVC pipe with solvent weld joints.
  2. Cast-iron hub and spigot pipe and fittings.

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. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings".
- E. 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.
- F. 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.
- G. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
  - 1. Horizontal Drainage Piping: 2 percent downward in direction of flow for piping NPS 2 and smaller; 1 percent downward in direction of flow for piping NPS 3 and larger.
  - 2. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- H. 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.
- I. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- J. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- K. Install PVC soil and waste drainage piping according to ASTM D 2321.
- L. 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 or cast-iron piping shall be installed.

3.04 JOINT CONSTRUCTION

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.
- B. Cast-Iron, Soil-Piping Joints: Make joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
  - 1. Gasketed Joints: Make with rubber gasket matching class of pipe and fittings.

3.05 HANGER AND SUPPORT INSTALLATION

- A. 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.
- B. Install supports according to Division 15 Section "Hangers and Supports."
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.
- E. 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 DN 50): 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.
- F. 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.
- G. 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 existing 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 and Storm 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.

SANITARY WASTE AND VENT PIPING

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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.
- 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 15160 – FACILITY STORM DRAINAGE 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 storm drainage piping inside the building and to locations indicated:
  - 1. Pipe, tube, and fittings.
  - 2. Special pipe fittings.
- B. Related Sections include the following:
  - 1. Division 15 Section 15430 "Plumbing Specialties."

1.03 DEFINITIONS

- A. PVC: Polyvinyl chloride plastic.

1.04 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working-pressure, unless otherwise indicated:
  - 1. Storm Drainage Piping: 10-foot head of water for a minimum of 15 minutes without loss of water level; or 5 psig air pressure for a minimum of 15 minutes without loss of air pressure.

1.05 SUBMITTALS

- A. Product Data: For pipe, tube, fittings, and couplings.
- B. Field quality-control inspection and test reports.

1.06 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic drain piping and "NSF-sewer" for plastic sewer piping.
- C. Latest revision of all the standards specified shall apply.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

- A. Refer to Part 3 "Piping Application" Article for applications of pipe, tube, fitting, and joining materials.

2.02 PVC DWV PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM D 4396 for DWV PVC dip ASTM D 1784 for fitting NSF 14.
  - 1. Manufacturer:

- a. Charlotte  
FACILITY STORM DRAINAGE PIPING

- b. US Pipe
  - c. Nibco
  - d. Lasco
2. Solvent Cement ASTM D 2564-12.
- a. Charlotte
  - b. US Pipe
  - c. Nibco
  - d. Lasco

2.03 SPECIAL PIPE FITTINGS

- A. Flexible, Nonpressure Pipe Couplings: Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition pattern. Include shear ring, ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.
- 1. Manufacturers:
    - a. Dallas Specialty & Mft. Co.
    - b. Fernco, Inc.
    - c. Mission Rubber Co.
    - d. NDS, Inc.
  - 2. Sleeve Materials:
    - a. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
    - b. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

PART 3 - EXECUTION

3.01 PIPING APPLICATIONS

- A. Aboveground storm drainage piping NPS 6 and smaller shall be the following:
- 1. Schedule 40 PVC DWV pipe and fittings, cemented joints.

3.02 PIPING INSTALLATION

- A. Basic piping installation requirements are specified in Division 15 Section 15010 "Common Work Results for Plumbing."
- B. Make changes in direction for storm drainage piping using appropriate branches, bends, and long-sweep bends. 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.
- C. Install storm drainage piping at the following minimum slopes, unless otherwise indicated:
- 1. Building Storm Drain: 1 percent downward in direction of flow for piping NPS 3 and larger.
- D. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.03 JOINT CONSTRUCTION

- A. Basic piping joint construction requirements are specified in Division 15 Section 15010 "Common Work Results for Plumbing."

3.04 HANGER AND SUPPORT INSTALLATION

- A. Pipe hangers and supports are specified in Division 15 Section 15060 "Hangers and Supports for Mechanical Piping and Equipment." 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.
  - 3. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Install supports according to Division 15 Section 15060 "Hangers and Supports for Mechanical Piping and Equipment."
- C. Support vertical piping at base and at each floor.
- D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.
- E. 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 DN 50): 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.

3.05 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect storm drainage piping to roof drains and storm drainage specialties.

3.06 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.
  - 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.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test storm drainage 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 storm drainage piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.

3. Test Procedure: Test storm drainage 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. From 15 minutes 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. Prepare reports for tests and required corrective action.

3.07 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.

END OF SECTION 15160

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.

1.03 PROJECT CONDITIONS

- A. Gas System Pressures: Primary building 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.
- 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 PIPING SPECIALTIES

- A. Flexible Connectors: ANSI Z21.24, copper alloy.

2.06 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.

### 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. Connect to existing fuel gas at service entrance and extend to rooftop units.
- B. Install new shutoff valve downstream from existing service meter.

#### 3.03 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, 1 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.

#### 3.04 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.

### 3.05 PIPING INSTALLATION

- A. Basic piping installation requirements are specified in Division 15 Section "Basic Mechanical Materials and Methods."
- B. 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.
- C. 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.
- D. Install fuel gas piping at uniform grade of 0.1 percent slope upward toward risers.
- E. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- F. Connect branch piping from top or side of horizontal piping.
- G. 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.
- H. 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.
- I. Install flanges on valves, specialties, and equipment having NPS 2-1/2 and larger connections.

### 3.06 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. Braze Joints: Make with brazing alloy with melting point greater than 1000 deg F. Brazing alloys containing phosphorus are prohibited.
- C. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

3.07 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."
  
- B. Rooftop Supports:
  - 1. Manufacturers:
    - a. MIRO Industries, Inc.
    - b. Mapa Products.

3.08 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."

3.09 PAINTING

- A. Comply with requirements in Division 09 painting Sections for painting interior and exterior natural-gas piping.
  
- B. Paint exposed, exterior metal piping, valves, service regulators, brackets and piping specialties, except components with factory-applied paint or protective coating.
  - 1. Alkyd System: MPI EXT 5.1D.
    - a. Prime Coat: Alkyd anticorrosive metal primer.
    - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
    - c. Topcoat: Exterior alkyd enamel: Flat.
    - d. Color: Safety yellow.

3.10 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 valves and specialties.
- D. Verify that specified piping tests are complete.

END OF SECTION 15194

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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. Mop basins.

- 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.

- 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.

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- 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.

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 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

PLUMBING FIXTURES

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.

2.04 TOILET SEATS

- A. Toilet Seat: Solid plastic.
  1. Manufacturers:
    - a. Bemis Mfg. Co.
    - b. Beneke Corp.
    - c. Church Products.
    - d. Olsonite Corp.
    - e. Plumbtech.
  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.

2.05 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. Truebro

2.06 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 piping 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.

2.07 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:
  - 1. Elkay Mfg. Co.
  - 2. Just Mfg. Co.

2.12 MOP BASINS

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- 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.
- 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.
- 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 – PLUMBING 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. Wall hydrants.
- 2. Balancing valves.
- 3. Miscellaneous piping specialties.
- 4. Cleanouts.
- 5. Roof drains
- 6. Backflow preventer.

- B. Related Sections on the drawings include the following:

- 1. Section "Basic Mechanical Materials and Methods" for thermometers and pressure gages.

1.03 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:

- 1. Domestic Water Piping: 125 psig.
- 2. Sanitary Waste and Vent Piping: 10-foot head of water.
- 3. Storm Drainage Piping: 10-foot head of water
- 4. Gas Piping: 125 psig.

1.04 SUBMITTALS

- A. Product Data: Include rated capacities and shipping, installed, and operating weights. Indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections for the following:

- 1. Balancing valves.
- 2. Wall hydrants.
- 3. Drain valves and hydrants.
- 4. Cleanouts and roof drains.
- 5. Downspout nozzles.
- 6. Backflow preventer

- B. Field test reports.
- C. Operation and Maintenance Data: For plumbing specialties to include in maintenance manuals. Include the following:
  - 1. Balance valves.
  - 2. Wall hydrants.
  - 3. Backflow preventer

1.05 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of plumbing specialties and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements".
- B. Plumbing specialties shall bear label, stamp, or other markings of specified testing agency.
- 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. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for piping materials and installation.
- E. NSF Compliance:
  - 1. Comply with NSF 61, "Drinking Water System Components--Health Effects, Sections 1 through 9", for potable domestic water plumbing specialties.

1.06 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage, unless noted otherwise, and identified with labels describing contents.
  - 1. Operating Key Handles: One key handle per unit installed for each key-operated hose bibb and hydrant installed.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. 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 WALL HYDRANTS

- A. Manufacturers:



1. Josam Co.
2. Smith, Jay R. Mfg. Co.
3. Zurn Industries.
4. Woodford Manufacturing Co.

B. General: ASME A112.21.2M, key-operation hydrant with pressure rating of 125 psig (860 kPa).

1. Inlet: NPS ¾ 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, 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: Polished chrome plate or stainless steel.

### 2.03 BALANCING VALVES

A. Self-actuating thermostatic recirculation valve:

1. Manufacturer:
  - a. Therm-Omega-Tech.

B. Copper-Alloy Calibrated Balancing Valves:

1. Manufacturers:
  - a. Armstrong International, Inc.
  - b. ITT Industries; Bell & Gossett Div.
  - c. Nexus Ultra Series.
  - d. NIBCO INC. T1710.
  - e. Taco, Inc.
2. Type: Ball or Y-pattern globe valve with two readout ports and memory setting indicator.
3. Body: Brass or bronze.
4. Size: Same as connected piping, but not larger than NPS 2.
5. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

C. Domestic Flow Station:

1. Manufacturers:
  - a. Faco (1-800-752-5900)
2. Preassembled Unit Consisting of:
  - a. Manual flow control valve (MFCV).
  - b. Swing type check valve rated for 200psi.
  - c. Union connections on each side of check valve.

- d. Pressure/Temperature test plugs across MFCV.
  - e. Full port, union end ball valves for shutoff.
- D. 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. Manufacturers:
    - a. Conbraco Industries, Inc.
    - b. Crane Co.; Crane Valve Group; Crane Valves.
    - c. Milwaukee Valve Company.
    - d. NIBCO, INC.

#### 2.04 MISCELLANEOUS PIPING SPECIALTIES

- A. Water Hammer Arresters: ASSE 1010 or PDI-WH 201, metal-bellows type with pressurized metal cushioning chamber. Sizes indicated are based on ASSE 1010 or PDI-WH 201, Sizes A through F.
- 1. Manufacturers:
    - a. Josam Co.
    - b. Smith, Jay R. Mfg. Co.
    - c. Zurn Industries.
    - d. Mifab.
    - e. Sioux Chief
- B. Hose Bibbs: Bronze body with replaceable seat disc complying with ASME A112.18.1M for compression-type faucets. Include NPS 1/2 or NPS 3/4 threaded or solder-joint inlet, of design suitable for pressure of at least 125 psig; integral, nonremovable, drainable hose-connection vacuum breaker; and garden-hose threads complying with ASME B1.20.7 on outlet.
- 1. Finish for Equipment Rooms: Rough bronze.
  - 2. Finish for Service Areas: Chrome plated.
  - 3. Finish for Finished Rooms: Chrome plated.
  - 4. Operation for Equipment Rooms: Wheel handle.
  - 5. Operation for Service Areas: Operating key.
  - 6. Operation for Finished Rooms: Operating key.
  - 7. Include operating key with each operating-key hose bibb.
  - 8. Include integral wall flange with each chrome- or nickel-plated hose bibb.
  - 9. Basis of Design – Chicago Faucets.
- C. Downspout Nozzles: Decorative nickel bronze glue-on nozzle with anti-theft escutcheon and bird screen.
- 1. Manufacturer:
    - a. RectorSeal.
- D. Deep-Seal Traps: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap seal primer valve connection.

1. NPS 2: 4-inch- minimum water seal.
  2. NPS 2-1/2 and Larger: 5-inch- minimum water seal.
- E. Fixed Air-Gap Fittings: Manufactured cast-iron or bronze drainage fitting with semiopen top with threads or device to secure drainage inlet piping in top and bottom spigot or threaded outlet larger than top inlet. Include design complying with ASME A112.1.2 that will provide fixed air gap between installed inlet and outlet piping.
- F. Stack Flashing Fittings: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.

## 2.05 SLEEVE PENETRATION SYSTEMS

- A. Manufacturers:
1. ProSet Systems, Inc.
  2. 3-M Manufacturing.
  3. Dow.
  4. Specified Technologies, Inc.
- B. Description: UL 1479, through-penetration firestop assembly consisting of sleeve and stack fitting with firestopping plug.
1. Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.
  2. Stack Fitting: ASTM A 48 (ASTM A 48M), gray-iron, hubless-pattern, wye-branch stack fitting with neoprene O-ring at base and gray-iron plug in thermal-release harness in branch. Include PVC protective cap for plug.
    - a. Special Coating: Include corrosion-resistant interior coating on fittings for plastic chemical waste and vent stacks.

## 2.06 FLASHING MATERIALS

- A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:
1. General Use: 4-lb/sq. ft., 0.0625-inch thickness.
  2. Vent Pipe Flashing: 3-lb/sq. ft., 0.0469-inch thickness.
  3. Burning: 6-lb/sq. ft., 0.0938-inch thickness.
- B. Copper Sheet: ASTM B 152 (ASTM B 152M), of the following minimum weights and thicknesses, unless otherwise indicated:
1. General Applications: 12 oz./sq. ft.
  2. Vent Pipe Flashing: 8 oz./sq. ft..
- C. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and 0.04-inch minimum thickness, unless otherwise indicated. Include G90 (Z275) hot-dip galvanized, mill-phosphatized finish for painting if indicated.
- D. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil minimum thickness.

- E. Fasteners: Metal compatible with material and substrate being fastened.
- F. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.
- G. Solder: ASTM B 32, lead-free alloy.
- H. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

## 2.07 CLEANOUTS

- A. Cleanouts, C.O., W.C.O.: Comply with ASME A112.36.2M.
  - 1. Application: Wall cleanout and cleanout plug, for installation in exposed piping.
  - 2. Manufacturers:
    - a. Josam Co.
    - b. Smith, Jay R. Mfg. Co.
    - c. Zurn Industries.
    - d. Mifab
    - e. Sioux Chief.
  - 3. Application: Floor cleanout.
  - 4. Manufacturers:
    - a. Sioux Chief "Finish Line"
    - b. Josam "Leveleze II"
    - c. Zurn BZ Series "Level-Trol".
  - 5. Body or Ferrule Material: Cast iron or combination cast iron/ABS body and frame.
  - 6. Clamping Device: Required.
  - 7. Outlet Connection: Spigot.
  - 8. Closure: Brass plug with tapered threads complying with ANS B2.1, countersunk head.
  - 9. Adjustable Housing Material: Cast iron with threads.
  - 10. Frame and Cover Material and Finish: Nickel-bronze/brass with three hold down vandal resistant screws.
  - 11. Frame and Cover Shape: Round.
  - 12. Top Loading Classification: Light duty.

## 2.08 ROOF DRAINS

- A. Roof Drains designated RD-1.
  - 1. Application: Combination roof drain and overflow roof drain. Comply with ASME A112.21.2M.
  - 2. Manufactures:
    - a. Josam Co.
    - b. Smith, Jay R. Mfg. Co.
    - c. Zurn Industries.
    - d. Mifab.
  - 3. Body Material: Cast iron.
  - 4. Combination Flashing Ring and Gravel Stop: Required.

5. Outlet: Bottom.
6. Dome Material: Cast iron.
7. Expansion Joint: Required.
8. Underdeck Clamp: Required.
9. Sump Receiver: Required.
10. 2" Water Dam Collar or Standpipe: Required for overflow drains.
11. Provide extension to match insulation thickness.

## 2.09 BACKFLOW PREVENTERS

### B. Manufacturers: [IU Standard is Wilkens]

1. Ames Co., Inc. No. 4000 Stainless Steel.
2. Watts Water Technologies
3. Wilkins Water Control Products
4. Febco.

### C. 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.

### D. Pipe-Applied, Atmospheric-Type Vacuum Breakers: ASSE 1001, with floating disc and atmospheric vent.

### E. 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.

### F. Intermediate Atmospheric-Vent Backflow Preventers: ASSE 1012, suitable for continuous pressure application. Include inlet screen and two independent check valves with intermediate atmospheric vent.

### G. 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.

### H. 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.

### I. Back-Siphonage Backflow Vacuum Breakers: ASSE 1056, suitable for continuous pressure and backflow applications. Include shutoff valves, check valve, test cocks, and vacuum vent.

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.
  - 2. Locate at each change in direction of piping greater than 45 degrees.
  - 3. Locate at minimum intervals of 100 feet for all pipe sizes.
  - 4. Locate at base of each vertical soil and waste stack.
- C. Install cleanout deck plates with top flush with finished floor, for floor cleanouts for piping below floors.
- D. Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping. Screws shall be vandal-resistant.
- E. Install flashing flange and clamping device with each stack and cleanout passing through floors with waterproof membrane.
- F. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions.
  - 1. Install roof-drain flashing collar or flange so no leakage occurs between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
  - 2. Position roof drains for easy access and maintenance.
- G. Fasten wall-hanging plumbing specialties securely to supports attached to building substrate if supports are specified and to building wall construction if no support is indicated.
- H. Fasten recessed-type plumbing specialties to reinforcement built into walls.
- I. Install wood-blocking reinforcement for wall-mounting and recessed-type plumbing specialties.
- J. Install individual shutoff valve in each water supply to plumbing specialties. Use ball, or globe valve if specific valve is not indicated. Install shutoff valves in accessible locations. Refer to Division 15 Section "General Duty Valves" for general-duty ball, butterfly, check, and globe valves.
- K. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.
- L. 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.
- M. Install balancing valves in locations where they can easily be adjusted.

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.
- C. Connect plumbing specialties to piping specified in other Division 15 Sections.
- D. Ground equipment.
- E. 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.
- F. Connect plumbing specialties and devices that require power according to Division 16 Sections.

### 3.03 FLASHING INSTALLATION

- A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
  - 1. Lead Sheets: Solder joints of lead sheets 4-lb/sq. ft., 0.0625-inch thickness or thinner.
  - 2. Copper Sheets: Solder joints of copper sheets.
- B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
  - 1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
  - 2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
  - 3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.
- C. Set flashing on floors and roofs in solid coating of bituminous cement.
- D. Secure flashing into sleeve and specialty clamping ring or device.
- E. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Division 07 Section "Sheet Metal Flashing and Trim."
- F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.
- G. Fabricate and install flashing and pans, sumps, and other drainage shapes.

### 3.05 PROTECTION

- H. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- I. Place plugs in ends of uncompleted piping at end of each day or when work stops.
- J. Install Studor Maxi-Vents and Maxi-Caps on vents-through-roof when located within 15 ft. radius of mechanical units with fresh-air intakes.
- K. Protect exposed PVC vents-through-roof with 2 coats of latex paint. Color per Architect.

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.

- 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: single station ADA cooler and glass filler
    - a. Cabinet: stainless steel
    - 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.

### 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.
- 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.

## DRINKING FOUNTAINS AND WATER COOLERS

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.

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 15732 – PACKAGED OUTDOOR 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 packaged, outdoor, central-station air-handling units (rooftop units) with the following components and accessories:
  - 1. Suitable for variable air volume operation.
  - 2. Direct-expansion cooling
  - 3. Modulating gas heat.
  - 4. Economizer outdoor- and return-air damper section.
  - 5. Relief air damper section, gravity
  - 6. Multi-zone damper section, see list of alternates.
  - 7. Adapter curbs and equipment rails as required
- B. Related Sections include the following:
  - 1. Division 15 Section "Instrumentation and Controls." It shall be the work of section 15732 to coordinate with section 15900 to ensure a complete and workable system.

1.03 SUBMITTALS

- A. Product Data: Include manufacturer's technical data for each RTU, including rated capacities, dimensions, required clearances, characteristics, furnished specialties, and accessories.
- B. Performance compliance with Equipment Schedule: Include performance at normal cooling load, part load dehumidification load, and dehumidification load as shown on the rooftop unit schedule in the plan sheets. Unit must meet minimum capacities at these design conditions.
- C. 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. Wiring Diagrams: Power, signal, and control wiring.
- D. Operation and Maintenance Data: For RTUs to include in emergency, operation, and maintenance manuals.
- E. Warranty: Special warranty specified in this Section.

1.04 QUALITY ASSURANCE

- A. ARI Compliance:
  - 1. Comply with ARI 210/240 and ARI 340/360 for testing and rating energy efficiencies for RTUs.
  - 2. Comply with ARI 270 for testing and rating sound performance for RTUs.
- B. ASHRAE Compliance:
  - 1. Comply with ASHRAE 15 for refrigeration system safety.
  - 2. Comply with ASHRAE 33 for methods of testing cooling and heating coils.

3. Comply with applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
- C. ASHRAE/IESNA 90.1-2010 Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2010 Section 6 - "Heating, Ventilating, and Air-Conditioning."
- D. NFPA Compliance: Comply with NFPA 90A and NFPA 90B.
- E. UL Compliance: Comply with UL 1995.
- F. 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.

1.05 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace components of RTUs that fail in materials or workmanship within specified warranty period.
  1. Warranty Period for Compressors: Manufacturer's standard, but not less than five years from date of Substantial Completion. Warranty shall exclude labor.
  2. Warranty Period for Control Boards: Manufacturer's standard, but not less than three years from date of Substantial Completion. Warranty shall exclude labor.
  3. Warranty Period for gas furnaces and gas train: Manufacturer's standard, but not less than five years from date of Substantial Completion. Warranty shall exclude labor.

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.
  1. Fan Belts: One extra set for each belt-driven fan.
  2. Filters: One extra set of filters for each unit.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Nesbitt - Engineered Air
  2. Trane
  3. Carrier
  4. Substitutions shall be considered under the provisions of Div. 01 and the "Instructions to Bidders."

2.02 CASING

- A. General Fabrication Requirements for Casings: Formed and reinforced double-wall insulated panels, fabricated to allow removal for access to internal parts and components, with joints between sections sealed.
- B. Exterior Casing Material: Galvanized steel with factory-painted finish, with pitched roof panels and knockouts with grommet seals for electrical and piping connections and lifting lugs.
  1. Exterior Casing Thickness: minimum 0.052 inch.
- C. Inner Casing Fabrication Requirements:

- 1. Inside Casing: Galvanized steel, 0.034 inch.
  - D. Casing Insulation and Adhesive: Comply with NFPA 90A or NFPA 90B.
    - 1. Materials: ASTM C 1071, Type I.
    - 2. Thickness: 2 inch.
  - E. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2010.
- 2.03 FANS
- A. Belt-Driven Supply-Air Fans: Double width, forward curved, centrifugal; with permanently lubricated, single-speed motor installed on an adjustable fan base resiliently mounted in the casing. Aluminum or painted-steel wheels, and galvanized- or painted-steel fan scrolls.
  - B. Condenser-Coil Fan: Propeller, mounted on shaft of permanently lubricated motor.
- 2.04 COILS
- A. Supply-Air Refrigerant Coil:
    - 1. Aluminum-plate fin and seamless internally grooved copper tube in steel casing with equalizing-type vertical distributor.
    - 2. Polymer strip shall prevent all copper coil from contacting steel coil frame or condensate pan.
    - 3. Coil Split: Interlaced.
    - 4. Factory installed internally sloped condensate drain pan with a minimum 3/4-inch NPT connection with horizontal drain and shall slide out for cleaning and shall conform to ASHRAE 62 self-draining provisions.
- 2.05 REFRIGERANT CIRCUIT COMPONENTS
- A. Compressor: Hermetic, scroll, mounted on vibration isolators; with internal overcurrent and high-temperature protection, internal pressure relief.
    - 1. Variable speed down to 25% of full capacity
  - B. Refrigeration Specialties:
    - 1. Refrigerant: R-407C, R-410A, R134A.
    - 2. Expansion valve with replaceable thermostatic element.
    - 3. Refrigerant filter/dryer.
    - 4. Manual-reset high-pressure safety switch.
    - 5. Automatic-reset low-pressure safety switch.
    - 6. Minimum off-time relay.
    - 7. Automatic-reset compressor motor thermal overload.
    - 8. Brass service valves installed in compressor suction and liquid lines.
    - 9. Hot-gas reheat solenoid valve with a replaceable magnetic coil.
- 2.06 GAS HEATING SECTION
- A. Indirect fired stainless steel with minimum 5:1 turndown.
  - B. FM or IRI gas train

2.07 AIR FILTRATION

- A. Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
  - 1. Pleated: 2" thick, Minimum 90 percent arrestance, and MERV 13
- B. Filter section shall have hinged access doors and handle for tool-less opening.

2.08 DAMPERS

- A. Outdoor-Air Damper: dry-bulb economizer capable
- B. Barometric relief damper, coordinated with economizer
- C. Outdoor- and Return-Air Mixing Dampers: Parallel- or opposed-blade galvanized-steel dampers mechanically fastened to cadmium plated for galvanized-steel operating rod in reinforced cabinet. Connect operating rods with common linkage and interconnect linkages so dampers operate simultaneously.
  - 1. Damper Motor: Modulating with adjustable minimum position.
  - 2. Relief-Air Damper: Gravity actuated or motorized, as required by ASHRAE/IESNA 90.1-2004, with bird screen and hood.
- D. Multi-zone dampers: hot-deck/cold-deck dampers size and number to match plans; single shaft for both, damper operators be section 15900.

2.09 ELECTRICAL POWER CONNECTION

- A. Provide for single connection of power to unit with unit-mounted disconnect switch accessible from outside unit and control-circuit transformer with built-in overcurrent protection.

2.10 MOTORS

- A. These shall be premium efficiency and suitable for use with VFDs.

2.11 CONTROLS

- A. Controls shall be by this section, to control
  - 1. DX cooling,
  - 2. gas heating,
  - 3. capacity control for both the above,
  - 4. fan speed where units are VAV; this shall include VFD
  - 5. OA damper (modulating) and relief air damper for CO2 control and economizer operation
- B. Interface with section 15900 shall be suitable for all sequences listed. Section 15900 shall provide occupied/unoccupied signal and room space temperatures, VAV terminal controls, duct pressure sensing, space CO2, heating/cooling lock-outs
- C. Multi-zone dampers shall be by this section, damper operators and zone thermostats shall be by section 15900.
- D. Open protocol communication interface, to allow unit mounted controls to be viewed and adjusted from section 15900 front end.
- E. Equipment and sequence of operation are specified on the plans and in Division 15 Section "Instrumentation and Controls."

2.12 ACCESSORIES

- A. Hail guards for vertical surface condenser coils of galvanized steel, painted to match casing.



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 performance of RTUs.
- B. Examine roughing-in for RTUs to verify actual locations of piping and duct connections before equipment installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Equipment Mounting: Install RTUs on roof curb using elastomeric pads.
  - 1. Minimum Deflection: 1/4 inch.
- B. Adapter curbs and equipment rails shall be equal to MicroMetl
  - 1. Galvanized steel with 2" thick wolmanized nailer
- C. Unit Support: Install unit level. Coordinate roof penetrations and flashing with roof construction.

3.03 CONNECTIONS

- A. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain or area drain.
- B. Install piping adjacent to RTUs to allow service and maintenance.
- C. Duct installation requirements are specified in other Division 15 Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:
  - 1. Connect supply ducts to RTUs with flexible duct connectors specified in Division 15 Section "Duct Accessories."

3.04 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
- B. Perform tests and inspections and prepare test reports.
  - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing. Report results in writing.
- C. Tests and Inspections:
  - 1. After installing RTUs and after electrical circuitry has been energized, test units for compliance with requirements.
  - 2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
  - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
  - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Remove and replace malfunctioning units and retest as specified above.

3.05 STARTUP SERVICE

- A. Complete installation and startup checks according to manufacturer's written instructions and do the following:
1. Inspect for visible damage to unit casing.
  2. Inspect for visible damage to compressor, coils, and fans.
  3. Inspect internal insulation.
  4. Verify that labels are clearly visible.
  5. Verify that clearances have been provided for servicing.
  6. Verify that controls are connected and operable.
  7. Verify that filters are installed.
  8. Clean condenser coil and inspect for construction debris.
  9. Remove packing from vibration isolators.
  10. Inspect operation of barometric relief dampers.
  11. Verify lubrication on fan and motor bearings.
  12. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
  13. Adjust fan belts to proper alignment and tension.
  14. Start unit according to manufacturer's written instructions.
    - a. Start refrigeration system.
    - b. Do not operate below recommended low-ambient temperature.
  15. Inspect and record performance of interlocks and protective devices; verify sequences.
  16. Operate unit for an initial period as recommended or required by manufacturer.
  17. Adjust and inspect high-temperature limits.
  18. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers.
  19. Start refrigeration system and measure and record the following when ambient is a minimum of 15 deg F above return-air temperature:
    - a. Coil leaving-air, dry- and wet-bulb temperatures.
    - b. Coil entering-air, dry- and wet-bulb temperatures.
    - c. Outdoor-air, dry-bulb temperature.
    - d. Outdoor-air-coil, discharge-air, dry-bulb temperature.
  20. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration.
  21. Simulate maximum cooling demand and inspect the following:
    - a. Compressor refrigerant suction and hot-gas pressures.
    - b. Short circuiting of air through condenser coil or from condenser fans to outdoor-air intake.
  22. Verify operation of remote panel including pilot-light operation and failure modes. Inspect the following:
    - a. Low-temperature safety operation.
    - b. Economizer to minimum outdoor-air changeover.
    - c. Relief-air operation.
  23. After startup and performance testing and prior to Substantial Completion, replace existing filters with new filters.

3.06 CLEANING AND ADJUSTING

- A. After completing system installation and testing, adjusting, and balancing RTU and air-distribution systems, clean filter housings and install new filters.

3.07 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain RTUs.

END OF SECTION 15732

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. This section includes the external sealing of all ducts to remain.
- 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.

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. Stainless Steel: ASTM A 480/A 480M, Type 316, sheet form with No. 4 finish for surfaces of ducts exposed to view; and Type 304, sheet form with No. 1 finish for concealed ducts.
- 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 with mill finish for concealed ducts.
- D. Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- E. 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 2"
- 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.
- 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." 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.
- 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. Seal externally insulated ducts before insulation installation.
- 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."
- 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

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes cleaning of the following existing duct systems:
  - 1. Supply duct, medium pressure, high velocity ductwork and return ductwork.

1.3 DEFINITIONS

- A. ASCS: Air System Cleaning Specialist.
- B. NADCA: National Air Duct Cleaners Association.
- C. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

1.4 SUBMITTALS

- A. Manufacturer Certificates: Signed by manufacturers certifying that products comply with requirements.
- B. Qualification Data: For ASCS.

1.5 QUALITY ASSURANCE

- A. ASCS Qualifications: A certified member of NADCA.
  - 1. Certification: Employ an ASCS certified by NADCA on a full-time basis.
  - 2. Supervisor Qualifications: Certified as an ASCS by NADCA.
  - 3. Experience: Submit records of experience in the field of HVAC systems cleaning.
  - 4. Equipment, Materials, and Labor: Have equipment, materials, and labor required to perform specified services.
- B. Comply with current published standards of NADCA.

**PART 2 - PRODUCTS**

2.1 SHEET METAL MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated.

- B. Galvanized-Steel Sheet: Lock-forming quality; complying with ASTM A 653/A 653M and having G60 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.
- C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- D. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

## 2.2 DUCT-MOUNTING ACCESS DOORS AND HARDWARE

- A. Shall comply with requirements of section 15820

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine systems to determine appropriate methods, tools, and equipment required for performance of work.
- B. Prepare written report listing conditions detrimental to performance of work.
- C. Proceed with work only after unsatisfactory conditions have been corrected.

### 3.2 CLEANING

- A. Engage a qualified ASCS to clean the following existing to remain duct systems:
  - 1. Supply system, including air outlets.
  - 2. Return system, including air inlets.
  - 3. Flex duct to be replaced by section 15815 does not require cleaning.
- B. Perform cleaning before air balancing or mark position of dampers and air-directional mechanical devices before cleaning.
- C. Use duct-mounted access doors, as required, for physical and mechanical entry and for inspection.
  - 1. Install additional duct-mounting access doors to comply with duct cleaning standards.
- D. Mark position of dampers and air-directional mechanical devices before cleaning, and restore to their marked position on completion.
- E. Particulate Collection and Odor Control:
  - 1. Where venting vacuuming system inside building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron size (or greater) particles.
  - 2. When venting vacuuming system outside building, use filtration to contain debris removed from the HVAC system and locate exhaust down wind and away from air intakes and other points of entry into building.
- F. Clean the following metal-duct system components by removing visible surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers)
2. Ductwork internal surfaces and components including fan powered terminals.
3. Return-air ducts, dampers, and actuators, except in ceiling plenums. .
4. Supply-air ducts, dampers, actuators, and turning vanes.

G. Mechanical Cleaning Methodology:

1. Clean metal-duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of ducts so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts or duct liner.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment, and do not permit duct liner to get wet. .
5. Clean coils and coil drain pans according to NADCA 1992
6. Biocidal Agents and Coatings: Apply biocidal agents if fungus is present; use according to manufacturer's written instructions after removal of surface deposits and debris.

H. Cleanliness Verification:

1. Verify cleanliness after mechanical cleaning and before application of treatment, including biocidal agents and protective coatings.
2. Visually inspect metal-duct systems for contaminants.
3. Where contaminants are discovered, reclean and reinspect duct systems.

### 3.3 CONNECTIONS

- A. Reconnect ducts to fans and air-handling units with existing flexible connectors after cleaning ducts and flexible connectors. Replace existing damaged and deteriorated flexible connectors.
- B. Reconnect terminal units to supply ducts with existing flexible ducts or replace damaged and deteriorated existing flexible ducts with maximum 12-inch lengths of new flexible duct.
- C. Reconnect diffusers or light troffer boots to low-pressure ducts with existing flexible ducts or replace damaged and deteriorated existing flexible ducts with maximum 60-inch lengths of flexible duct clamped or strapped in place.
- D. Reconnect existing and new flexible ducts to metal ducts with draw bands.

### 3.4 FIELD QUALITY CONTROL

- A. Gravimetric Analysis: Sections of metal-duct system, chosen randomly by Owner, may be tested for cleanliness according to NADCA vacuum test gravimetric analysis.
  1. If analysis determines that levels of debris are equal to or lower than suitable levels, system shall have passed cleanliness verification.
  2. If analysis determines that levels of debris exceed suitable levels, system cleanliness verification will have failed and metal-duct system shall be recleaned and reverified.
- B. Report results of tests in writing.

END OF SECTION 15816

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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. Louvers
  2. Manual-volume dampers.
  3. Turning vanes.
  4. Duct-mounted access doors and panels.
  5. Flexible ducts.
  6. Flexible connectors.
  7. Duct accessory hardware.
  8. Fire and Fire/Smoke Dampers
- B. Related Sections include the following:
1. Division 15 "Ductwork"
  2. Division 15 Section 15855 "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.
- 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: Where installed in insulated ducts, 1-inch- (25-mm-) thick, fibrous-glass or polystyrene-foam board.

2.05 FLEXIBLE CONNECTORS

- 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 FIRE DAMPERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporate into the Work include, but are not limited to, the following:
  - 1. Air Balance Inc.; a division of Mestek, Inc.
  - 2. Arrow United Industries; a division of Mestek, Inc.
  - 3. Cesco Products; a division of Mestek, Inc.
  - 4. Greenheck Fan Corporation.
  - 5. METALAIRE Inc.
  - 6. Nailor Industries Inc.
  - 7. Ruskin Company.
  
- B. Type: Static; rated and labeled according to UL 555 by an NRTL.
  
- C. Closing rating in ducts up to 4-inch wg (1-kPa) static pressure class and minimum 4000-fpm (20-m/s).
  
- D. Fire Rating: 1- ½ hours.
  
- E. Frame: Curtain type with blades outside airstream, fabricated with roll-formed, 0.034-inch- (0.85 mm) thick galvanized steel; with mitered and interlocking corners.
  
- F. Mounting Sleeve: Factory or field-installed, galvanized sheet steel.
  
- G. Minimum Thickness: 0.052 or 0.138 inch (1.3 or 3.5 mm) thick, as indicated, and of length to suit application.
  
- H. Exception: Omit sleeve where damper-frame width permits direct attachment of perimeter mounting angles on each side of wall or floor; thickness of damper frame must comply with sleeve requirements.
  
- I. Mounting Orientation: Vertical or horizontal as indicated.

DUCT ACCESSORIES

- J. Blades: Roll-formed, interlocking, 0.034-inch- (0.85-mm-) thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- (0.85-mm-) thick, galvanized-steel blade connectors.
- K. Horizontal Dampers: Include blade lock and stainless-steel closure spring.
- L. Heat-Responsive Device: Replaceable, 165 deg F (74 deg C) fusible links, provide spare links for each damper furnished.

2.08 SMOKE DAMPERS

- A. Manufacturers: Same as Fire Dampers
- B. General Requirements: Label according to UL 55S by an NRTL.
- C. Smoke Detector: Integral, factory wired for single-point connection.
- D. Frame: Curtain type with blades outside airstream fabricated with roll-formed, 0.034-inch- (0.85-mm-) thick galvanized steel; with mitered and interlocking corners.
- E. Blades: Roll-formed, horizontal, interlocking, 0.034-inch- (0.85-mm-) thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- (0.85-mm-) thick, galvanized-steel blade connectors.
- F. Leakage: Class I
- G. Rated pressure and velocity to exceed design airflow conditions.
- H. Mounting Sleeve: Factory-installed, 0.052-inch- (1.3-mm-) thick, galvanized sheet steel; length to suit wall or floor application with factory-furnished silicone caulking.

2.09 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.

2.10 LOUVERS

- A. Fixed blade louvers, heavy gauge extruded aluminum.
- B. All Exterior Louvers shall anodized aluminum finish. Interior Louvers to be primed for field painting by Division 9.
- C. Bird Screen

- D. Exterior flange.
- E. Basis of Design is "Greenheck" Model ESD-403, high performance, drainable blade louver.
- F. Approved equals:
  - 1. American Warming and Ventilating, Inc.
  - 2. Industrial Louvers, Inc.
  - 3. Louvers & Dampers, Inc.
  - 4. NCA Manufacturing
  - 5. Reliable Products; Hart & Cooley, Inc
  - 6. Cesco Products

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- 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.
- F. Label access doors according to Division 15 Section 15500 "Mechanical Identification."
- G. Duct access doors shall be installed as required in locations suitable for resetting and inspecting fire dampers.

#### 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

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SECTION 15838 – POWER AND GRAVITY 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 “Hangers and Supports.”

1.02 SUMMARY

- A. This Section includes the following:
  - 1. Centrifugal roof ventilators.
  - 2. Cabinet fans
  - 3. Gravity ventilators and roof hoods

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.

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.
  - 1. Belts: One (1) set for each belt-driven unit.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Power and Gravity 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 CENTRIFUGAL ROOF VENTILATORS

- A. Description: Belt-driven or direct-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.
  - 1. Fans to be either up-blast or down-blast, per schedule. Kitchen exhaust fans to be up-blast.
- B. Housing: Removable, spun-aluminum, dome top and outlet baffle square, one-piece, aluminum base with venturi inlet cone.
- C. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.
- D. Belt-Driven Drive Assembly: Resiliently mounted to housing, with the following features:
  - 1. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
  - 2. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
  - 3. Pulleys: Cast-iron, adjustable-pitch motor pulley.
  - 4. Fan and motor isolated from exhaust airstream.
- E. Accessories:
  - 1. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.
  - 2. Bird Screens: Removable, 1/2-inch (13-mm) mesh, aluminum or brass wire.
  - 3. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
- F. Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inch- (40-mm-) thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch (40-mm) wood nailer. Size as required to suit roof opening and fan base.
  - 1. Configuration: Self-flashing without a cant strip, with mounting flange.
  - 2. Overall Height: 12 inches (300 mm).

2.03 GRAVITY VENTILATORS:

- A. General: Except as otherwise indicated, provide prefabricated aluminum gravity ventilator units of type and size indicated, modified as necessary to comply with requirements, and as required for complete installation.

- B. Hooded Gravity Ventilators: Provide gravity ventilators, hooded type, curb mounted, of size shown and as specified herein.
  - 1. Type: Stationary, natural draft type. Provide weatherproof housings to match power ventilators in materials and finish. Provide square or rectangular base to suit roof curb.
  - 2. Bird Screens: Provide removable bird screens, ½" mesh, 16-ga aluminum or brass wire.

#### 2.04 ROOF HOODS

- A. Factory or shop fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figures 5-6 and 5-7.
- B. Materials: Aluminum sheet, minimum 0.063-inch- (1.6-mm-) thick base and 0.050-inch- (1.27-mm-) thick hood; suitably reinforced.
- C. Roof Curbs: Galvanized-steel sheet; with mitered and welded corners; 1-1/2-inch- (40-mm-) thick, rigid fiberglass insulation adhered to inside walls; and 1-1/2-inch (40-mm) wood nailer. Size as required to fit roof opening and ventilator base.
  - 1. Configuration: Built-in cant and mounting flange.
  - 2. Overall Height: 12 inches (300 mm).
- D. Bird Screening: Aluminum, 1/2-inch- (12.7-mm-) square mesh, 0.063-inch (1.6-mm) wire.
- E. Insect Screening: Aluminum, 18-by-16 (1.4-by-1.6-mm) mesh, 0.012-inch (0.30-mm).

#### 2.05 PREFABRICATED ROOF CURBS, EQUIPMENT RAILS AND PIPE PORTALS

- A. General: Provide manufacturer's standard shop-fabricated units, modified if necessary to comply with requirements.
- B. Fabricate structural framing for units of structural quality sheet steel (ASTM A 570, Grade 40), formed to profiles indicated or, if not indicated, to manufacturer's standard profiles for coordination with roofing, insulation and deck construction. Configuration shall be self flashing with mounting flange, without cant strip. Weld corners and seam to form watertight units.
  - 1. Fabricated units from zinc-coated steel, ASTM A 446, Grade C, designation G90 hot-dip coating, mill phosphatized. Clean and paint with rust-inhibitive metal primer paint, of type recommended by manufacturer, 2.0 mils dry film thickness.
  - 2. Reinforce continuous runs of over 3'-0" length by inserting welded stiffeners of heavy gage with flanges as required to provide sufficient rigidity and strength to withstand maximum lateral forces in addition to superimposed vertical loads.
  - 3. Gage and Height: Fabricate units to height above roof surface of 12 inches.
  - 4. Roof Slope: For units installed on sloped or peaked roofs, taper curb to match roof slope. Minimum height on high side of sloped curb shall be 8 inches.
  - 5. Provide treated wood nailer, not less than 1-5/8" thick and of width indicated, but not less than width of support wall assembly. Anchor nailer securely to top of metal frame unit.
    - a. Provide lumber pressure treated with water-borne preservatives for "above ground" use, complying with AWPB LP-2.
  - 6. Fabricate exterior profile to receive insulation of thickness indicated or, if not indicated, of 1" thickness.
  - 7. Insulate units inside structural support wall with rigid glass fiber insulation board of approximately 3-lb. density and 1-1/2" minimum thickness, except as otherwise indicated.
    - a. Provide sound insulation insert for curbs so indicated. Construct of 1" thick rigid fiberglass panels secured in galvanized steel framework, with rounded edges to minimize air flow resistance.



8. Pipe Portals: Shall be pre-engineered style to allow for multiple sizes of several pipes to penetrate roof in one location.
  - a. Seal pipes with band clamps on rubber boot.
  - b. Allow for both electric power and control conduits through same portal.
  
9. Manufacturer: Subject to compliance with requirements, provide prefabricated roof curbs of the fan or ventilator manufacturer, or of one of the following:
  - a. Custom Curb, Inc.
  - b. Pate Co.
  - c. S&L Manufacturing Co.
  - d. ThyCurb Div; Thybar Corp.
  - e. KCC International

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install ventilators level and plumb.
  
- B. Secure roof-mounting fans to roof curbs with cadmium-plated hardware.
  
- C. Install units with clearances for service, maintenance, and code compliance.
  
- D. 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. Adjust belt tension.
  
- C. 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

THD

SECTION 15840 – TERMINAL UNITS

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. Shutoff single-duct air terminal units.
  - 2. Electric reheat coils suitable.
  - 3. Controls, including room thermostats, to be factory installed and commissioned.
- B. Related Sections include the following:
  - 1. Division 15 Section "Instrumentation and Controls", controls to be factory mounted.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated, include rated capacities, furnished specialties, sound-power ratings, and accessories.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
  - 1. Include a schedule showing unique model designation, room location, model number, size, and accessories furnished.
  - 2. Wiring Diagrams: Power, signal, and control wiring.
- C. Coordination Drawings: Reflected ceiling plans, drawn to scale, and coordinating air outlets with other items installed in ceilings, to ensure that maintenance access to air terminals complies with good practice and manufacturer's recommendations.
- D. Maintenance Data: For air terminal units to include in maintenance manuals. In addition to items specified in Division 1 include the following:
  - 1. Parts list of each terminal type.
  - 2. Troubleshooting maintenance guide.

1.04 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of air terminal units and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- 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. NFPA Compliance: Install air terminal units according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the manufacturers specified.
  - 1. Trane Co. (The);
  - 2. Anemostat
  - 3. Metalair
  - 4. Nailor
  - 5. Price
  - 6. Krueger

2.02 SHUTOFF SINGLE-DUCT AIR TERMINAL UNITS

- A. Configuration: Volume-damper assembly inside unit casing with control components located inside a protective metal shroud.
- B. Casing: 0.034-inch (0.85-mm) steel or 0.032-inch (0.8-mm) aluminum.
  - 1. Casing Lining: Minimum 1/2-inch- (13-mm-) thick, coated, fibrous-glass duct liner complying with ASTM C 1071; secured with adhesive. Cover liner with nonporous foil.
  - 2. Air Inlet: Round stub connection or S-slip and drive connections for duct attachment.
  - 3. Air Outlet: S-slip and drive connections.
  - 4. Access: Removable panels for access to dampers, RH coils and other parts requiring service, adjustment, or maintenance; with airtight gasket.
- C. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.
  - 1. Maximum Damper Leakage: ARI 880 rated, 2 percent of nominal airflow at 3-inch wg (750-Pa) inlet static pressure.
  - 2. Multipoint, averaging flow sensor ring with balancing tap.
- D. Attenuator Section: 0.034-inch (0.85-mm) steel sheet metal.
  - 1. Lining: 1/2-inch- (13-mm-) thick, coated, fibrous-glass duct liner complying with ASTM C 1071; secured with adhesive. Cover liner with nonporous foil.
- E. Electric Heat Section;
  - 1. Factory mounted and wired disconnect switch.
  - 2. The electric heater is a factory-provided and -installed, UL recognized resistance open-type heater with airflow switch.
  - 3. Disc-type automatic pilot duty thermal primary cutout, and manual reset load carrying thermal secondary device.
  - 4. Heater element material is nickel-chromium.
  - 5. Silicon-Controlled Rectifier (SCR) for modulation.
  - 6. UL recognized resistance open-type heater with airflow switch with thermal cutout, and manual reset load carrying thermal secondary device.
- F. DDC Controls: Single-package factory mounted and commissioned unitary controller and actuator with control transformer
  - 1. Pressure Independent
  - 2. Controls shall be by section 15900
  - 3. Commissioning of VAV terminal controls shall include: testing of electric heat contactors, controller addressing and testing, max and min air flow settings (occupied and unoccupied), min ventilation settings,

2.03 SOURCE QUALITY CONTROL

- A. Identification: Label each air terminal unit with plan number, nominal airflow, maximum and minimum factory-set airflows, coil type, and ARI certification seal.
- B. Verification of Performance: Rate air terminal units according to ARI 880.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install air terminal units level and plumb. Maintain sufficient clearance for normal service and maintenance.
  - 1. Contractor shall relocate and reconnect any terminal units judged by engineer to have insufficient maintenance access.

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 air terminal units to allow service and maintenance.
- C. Hot-Water Piping: In addition to requirements in Division 15 Section "Hydronic Piping," connect heating coils to supply with shutoff valve, strainer, control valve, and union or flange; and to return with balancing valve and union or flange.
- D. Connect ducts to air terminal units according to Division 15 Section "Metal Ducts" and "Duct Accessories."
- E. Ground units with electric heating coils according to Division 16 Section "Grounding and Bonding."
- F. Connect wiring according to Division 16 Section "Conductors and Cables."
- G. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.03 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 15840

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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.

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. Linear slot diffusers shall have insulated plenum box and accessible adjustments for right, left, or vertical air flow.
- E. 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.
- 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 HVAC INSTRUMENTATION AND CONTROLS**

### **PART 1 - GENERAL**

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

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. See section 15732 for controls to be factory mounted on RTUs. It shall be the work of this section to coordinate with section 15832 to ensure a complete and workable system.
  - 2. All annual licensing fees shall be included for a period of 5 years following substantial completion.
  - 3. Software to be on a CD that becomes property of the owner at the end of the job.
- B. Hardware and Software
- 1. All annual licensing and upgrade fees must be included provided by the vendor in their bid.
  - 2. Provide enough software/hardware keys (electronic password devices) for three simultaneous users of the system.
  - 3. Provide the software on a CD that is turned over with the O & M manuals.
  - 4. 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. System shall be web based, DDC controlled.
- 1. Single point connection to owner's LAN at location to be pre-approved by owner. Multiple connections not allowed.
- D. Related Sections include the following:
- 1. "Sequences of Operation" is specified on the plans.
  - 2. Section "General Mechanical Requirements."
  - 3. Section "Common Work Results for Mechanical."
  - 4. Section "Power and Gravity Ventilators."
  - 5. Section "Packaged Rooftop Air Conditioning Units"
  - 6. Section "Testing, Adjusting, and Balancing."

#### 1.3 DEFINITIONS

- A. DDC: Direct-digital controls.
- B. LAN: Local area network.
- C. MS/TP: Master-slave/token-passing.

D. PICS: Protocol Implementation Conformance Statement.

#### 1.4 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 16 sections

C. This system shall be capable of residing on the Internet without the purchase of any additional hardware or software by the owner. Final connection to the internet shall be by the owner.

D. Hardware Description: Provides PC-based-along DDC control system. Provide all hardware and software needed for connection to the WAN.

E. The DDC system shall be a WEBS based system using standard Internet browsers such as Internet Explorer, Chrome, or Firefox for viewing. The owner shall be able to view this system from any computer residing on the WAN using these browsers. Operating systems must be Windows XP or later.

F. 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 setpoints, schedules and other variables through the graphics.

1. Provide data connection in the main electrical room at a location approved by the owner.

G. It is the intention of this specification that all control shall be DDC with the exception of the use of electric line voltage thermostats on unit heaters, exhaust fans, etc. as specified. Actuation shall be electric.

H. The owner shall be able to connect directly to the DDC system for on site maintenance. Any software required for direct connection by the owner to the DDC system such as through a room temperature sensor, shall be provided. If licensing of this software is required updates of that software shall be provided at no cost to the owner for five years following substantial completion. Systems that require software/hardware keys for interface directly to the DDC system will no be allowed.

#### 1.5 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. Software Upgrade Kit: For Owner to use in modifying software to suit future power system revisions or monitoring and control revisions.

F. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

G. 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.

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.

## 1.6 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.

1.7 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.

1.8 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 Section "Panelboards, Distribution Panels and Cabinets" 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**

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Control Systems and DDC Components:
    - a. Alpha Controls, to match Jeffersonville Library
    - b. Harshaw-Trane
    - c. Substitutions shall only be considered with prior approval of the owner. Delete control components, in articles below, not required for Project. Add other features and capabilities as required.

2.2 DDC EQUIPMENT

- A. Application Software: Include all licensing fees and upgrades for a period of two (2) years following substantial completion. 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 or compact, 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. Rib mounted relays are not allowed.
5. Unit shall be provided with uninterruptable power supply, double online conversion.

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. Software: Update to latest version of software at Project completion. All software required to operate or to diagnose all aspects of the control system shall be included. Include all licensing fees and upgrades for a period of two (2) years following substantial completion. Include and implement the following capabilities from the control units:

1. Units of Measure: Inch-pound and SI (metric).
2. Programming Application Features: Include trend point, alarm messages, weekly scheduling, and interlocking.
3. Include Optimum start program for all HVAC units greater than 10,000 CFM.

## 2.3 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.
  - 4. Graphics: Color-coded graphic, laminated-plastic displays on doors, schematically showing system being controlled, with protective, clear plastic sheet bonded to entire door.

#### 2.4 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, packaged rooftop unit, 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 FMS. The FMS 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, both locally at the Controller and via the FMS communications network.

#### 2.5 VARIABLE FREQUENCY DRIVE (VFD)

- A. Single phase variable speed motors (ECM motors) that are capable of varying fan speed in response to an analog signal shall not require VFDs. Coordinate with section 238219 to ensure a complete and workable system.
- B. A combination VFD/disconnect package shall be field mounted by this section and wired (power) by Division 16.
  - 1. Variable Frequency Drive
    - a. Pulse Width Modulated Drive with IGBT Transistors.

- b. LCD Display and Keyboard.
  - c. English Language Electrical Values, Parameters, Self Test, Faults, and Diagnostics.
  - d. Power, Pending Fault, and Fault LED Indicator Lights.
  - e. Form C Fault Contacts.
  - f. 4-20 mA or 0-10 V Speed Input Signal.
- 2. Circuit Breaker Disconnect.
  - 3. Hand-Off-Auto (HOA) selector switch.
  - 4. Current Limiting NEMA Class T Fuses.
  - 5. Critical frequency avoidance.
  - 6. Power wiring in "liquid tight" conduit and junction boxes from VFD to motor.
  - 7. Line reactor
  - 8. Voltage and FLA shall be factory-set for the exact motor used in the air handler.
  - 9. VFD controls to attempt to auto-reset five times before alarm
- C. When provided with an optional factory mounted control system, an oversized control transformer shall be provided to power the temperature controls. Power wiring from this transformer to the controls, start/stop relay, start/stop wiring to the HOA switch and analog speed signal wiring to the VFD shall be wired and tested at the factory.
- D. Factory-mounted controls shall be covered by the air handler manufacturer's standard warranty.
- E. VFD manufacturer shall coordinate location of VFD with Division 16 contractor and provide dV/dT output filters or wave traps as required.
- F. Drives shall be ABB, Square D, or approved equal.

## 2.6 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 have setpoint adjustment on sensor, or be non-adjustable, as defined by location. Adjustment indications shall be warmer cooler only, no temperatures shown on sensors. Amount of adjustment shall be determined through software, but shall not exceed 3°F above and below nominal set point. No push button overrides of the unoccupied cycle.
    - g. Room sensors shall have a jack for direct connection to the equipment being controlled. If requested by the owner a minimum of ten connection cables shall be provided. Software/hardware keys for connection directly to the DDC system shall not be allowed.
    - h. 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. Status Inputs Fans: Differential for -pressure switch with adjustable range of 0 to 5 inches wg (0 to 1243 Pa), or current sensors (contractor's option).
  - 2. Status Inputs for Pumps: Differential-pressure switch piped across pump with adjustable pressure-differential range of 8 to 60 psig (55 to 414 kPa), or current sensor's (contractor's option).
  - 3. 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.
- E. Current sensors shall have sufficient sensitivity to allow for the indication of a no load or broken belt condition.
- F. Water-Flow Switches: Pressure-flow switches of bellows-actuated mercury or snap-acting type, with appropriate scale range and differential adjustment, with stainless-steel or bronze paddle. For chilled-water applications, provide vaporproof type. Paddle type switches are not permitted.
- G. Humidity Sensors: solid state humidity sensor with 0-10Vdc output. Accuracy +/-5% between 20 and 80% relative humidity. Temperature compensated.
- H. CO2 Sensors: These shall be installed in locations as shown on plans and sequences.
- 1. These shall be self calibrating devices with a 5-year calibration guarantee

## 2.7 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: No
  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. Airstream Thermostats: Two-pipe, fully proportional, single-temperature type, with adjustable set point in middle of range and adjustable throttling range, plug-in test fitting or permanent pressure gage, remote bulb, bimetal rod and tube, or averaging element.
- G. 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.

H. 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.

## 2.8 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. 7 inch-pounds/sq. ft. (86.8 kg-cm/sq. m) of damper.
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. Temperature Rating: Minus 22 to plus 122 deg F (minus 30 to plus 50 deg C).

## 2.9 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.
5. Dampers shall be TAMCO, Greenheck or approved equal.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify that dedicated power supplies are available to control units and operator workstation.

#### **3.2 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 23 Section 233300 "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 23 Section 230500 "Common Work Results for Mechanical."
- G. Install hydronic instrument wells, valves, and other accessories according to Division 23 Section 232113 "Hydronic Piping."
- H. Install electronic and fiber-optic cables according to this section.

#### **3.3 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 color orange.
  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 multi-conductor 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 orange 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 shall be rigid conduit. Other exposed conduit shall be EMT.
- H. Provide isolation strips between class I and class II wiring.
- I. All relay bases must be Din Rail mounted in a 6" square x 4" deep enclosure. Provide nylon, or plastic grommets at all locations where wires penetrate the enclosure.

### 3.4 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
1. Install piping adjacent to machine to allow service and maintenance.
- B. 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.

### 3.5 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. Engage a factory employed service representative to perform startup service. This shall be coordinated with the owner's commissioning authority.
- C. 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.
- D. 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.
  4. Note that many I/O points will need to be overridden in the software for testing/demonstration purposes. See sequence block concerning checkout on plans. It is the responsibility of this section to contact engineer with 8 working days notice to schedule checkout. Checkout may be local or remote (if allowed on project). Email engineer directly at [asteiner@sims-durkin.com](mailto:asteiner@sims-durkin.com)

### 3.6 DEMONSTRATION & TRAINING

- A. Provide a minimum of 4 hours training, to be conducted in 2 hour segments, to be scheduled within one year of substantial completion, timing to be coordinated with the owner.

### 3.7 ON-SITE ASSISTANCE

- A. Occupancy Adjustments: Within one year of date of Substantial Completion, provide up to three Project site visits, when requested by Owner, to adjust and calibrate components and to assist Owner's personnel in making program changes and in adjusting sensors and controls to suit actual conditions.

### 3.8 POINTS LIST

- A. As a minimum, the system shall be able to display, adjust, alarm, and control the following. For points that already exist, recalibrate existing data point and leave sensor in place, existing data point may continue to be used.
  1. VAV and MZ Packaged Roof Top Units
    - a. Fan commanded status
    - b. Fan speed
    - c. Stages of compressor cooling
    - d. Stages of heating
    - e. LAT
    - f. OA temperature

- g. Occupied/unoccupied status
  - h. CO2
  - i. Relief and OD damper control
2. VAV dampers
- a. Room temperature
  - b. Room set point
  - c. Primary air valve position and air flow.
  - d. Reheat percent
  - e. Space CO2, where shown.
  - f. LAT
3. Electric Vestibule Heaters (EHs):
- a. Status. These are to be locked out at all OAT above 60F
4. Exhaust and Relief Fans (all):
- a. Status.
  - b. Damper position. (where applicable)
  - c. Room temperature where shown as control point.

END OF DOCUMENT 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. Adjusting total HVAC systems to provide indicated quantities.
  - 3. Measuring electrical performance of HVAC equipment.
  - 4. Setting quantitative performance of HVAC equipment.
  - 5. Duct leakage testing
- 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.
  - 2. Field quality-control testing to verify that workmanship quality for system and equipment installation is specified in system and equipment Sections.

1.03 DEFINITIONS

- A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.
- B. Balance: To proportion flows within the distribution system, including submains, branches, and terminals, according to design quantities.
- C. AABC: Associated Air Balance Council.
- D. AMCA: Air Movement and Control Association.
- E. NEBB: National Environmental Balancing Bureau.
- F. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

1.04 SUBMITTALS

- A. Certified Testing, Adjusting, and Balancing Reports: Submit 2 paper copies and one digital (pdf) copy of reports prepared, as specified in this Section, on approved forms certified by the testing, adjusting, and balancing Agent.

1.05 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.

1.06 PREPARATION AND COORDINATION REQUIREMENTS – HVAC CONTROLS

- A. Written notice shall be submitted to the Engineer stating that the Control System is operating and controlling the HVAC System.
- B. The controls subcontractor shall have entered all data needed for the TAB Agency to begin work.
- C. The controls subcontractor shall be available to correct any problems that the TAB Agency might have with the systems.
- D. Software shall be made available to the TAB Agency.

1.07 PREPARATION AND COORDINATION REQUIREMENTS – MECHANICAL

- A. Written notice shall be submitted to the Engineer stating that the HVAC is operational and ready for the TAB Agency.
- B. The Mechanical Contractor shall have proved all units operational and all air outlets in the full open position.
- C. The Mechanical Contractor shall be available to correct any problems that the TAB Agency might have with any equipment or systems.
- D. The Mechanical Contractor shall furnish and install any replacement sheaves, pulleys and drive belts required for flow adjustments as determined by the TAB Agency. Adjustable sheaves shall be selected so that final adjustment position is in the middle third of the total adjustment range.
- E. All costs for additional work by the TAB Agency due to the Contractor's failure to comply with the above shall be paid by the Contractor and any subcontractor(s) for mechanical work.

1.08 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.

1.09 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.

1.10 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 and water distribution systems have been satisfactorily completed.
- D. Review start-up data/test sheet for the following:
  - 1. Duct leak testing.
  - 2. Factory start-ups.
  - 3. Control check out data sheets.
  - 4. Division 16, written notice of nameplate, heater verification.

1.11 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 test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, 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 approved submittal data of HVAC systems and equipment.
- C. Examine project record documents described in Division 1 Section "Project Record Documents."
- D. Examine equipment performance data, including fan and pump curves. Relate performance data to project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system. Calculate system effect factors to reduce the performance ratings of HVAC equipment when installed under conditions different from those presented when the equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with the design data and installed conditions.
- E. 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.
- F. Examine system and equipment test reports.
- G. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- H. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.
- I. 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.
- J. Examine terminal units, such as variable-air-volume boxes, to verify that they are accessible and their controls are connected and functioning.
- K. Examine equipment for installation and for properly operating safety interlocks and controls.

- L. Examine automatic temperature system components to verify the following:
  - 1. Dampers, valves, and other controlled devices operate by the intended controller.
  - 2. Dampers and valves are in the position indicated by the controller.
  - 3. Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open positions. This includes dampers in air handling units and variable-air-volume terminals.
  - 4. Thermostats and humidistats are located to avoid adverse effects of sunlight, drafts, and cold walls.
  - 5. Sensors are located to sense only the intended conditions.
  - 6. Sequence of operation for control modes is according to the Contract Documents.
  - 7. Controller set points are set at design values. Observe and record system reactions to changes in conditions. Record default set points if different from design values.
  - 8. Interlocked systems are operating.
  - 9. Changeover from heating to cooling mode occurs according to design values.
- M. Report deficiencies discovered before and during performance of testing, adjusting, and balancing procedures.

### 3.02 PREPARATION

- A. Prepare a testing, adjusting, and balancing plan that includes strategies and step-by-step procedures.
- B. Complete system readiness checks and prepare system readiness reports. Verify the following:
  - 1. Permanent electrical power wiring is complete.
  - 2. Automatic temperature-control systems are operational.
  - 3. Equipment and duct access doors are securely closed.
  - 4. Balance, smoke, and fire dampers are open.
  - 5. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
  - 6. Windows and doors can be closed so design conditions for system operations can be met.

### 3.03 GENERAL TESTING AND BALANCING PROCEDURES

- 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, pipes, 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.

### 3.04 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. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct airflow measurements.
- E. 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.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.
- I. Check for airflow blockages.
- J. Check condensate drains for proper connections and functioning.
- K. Check for proper sealing of air-handling unit components.
- L. Check for proper sealing of air duct systems.

### 3.05 LEAKAGE TESTING

- A. Discharge air flows shall be measured both at the unit outlet and at all air supply devices. Discharge air flow shall be plotted on a fan curve using the pressure measurements determined at start-up.

### 3.06 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. Duct leakage allowance: no more than 5% difference between the discharge of the unit and the sum of the outlets. Sealing of ducts shall be the responsibility of section 15815.

### 3.07 REPORTING

- A. Status Reports: As Work progresses, prepare reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

### 3.08 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 and hydronic 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. Terminal units.
  - 4. Position of balancing devices.

3.09 ADDITIONAL TESTS

- 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.
  
- C. Cross connect verification test and maximum/minimum flow tests.

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 - 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.

1.02 RELATED WORK SPECIFIED ELSEWHERE

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.

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.
- 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 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. Type MC cable:
  - 1. May be used as approved by Code.
  - 2. Factory assembly of one or more insulated conductors enclosed in a metallic of interlocking tape.
  - 3. Install all MC cable in a neat fashion. All unacceptable MC cable installation shall be removed and replaced at the Architect's discretion. MC cable shall run with buildings member and strapped as per NEC330.
  - 4. Do not install MC cable in or on masonry walls.
  - 5. All MC cable shall be concealed.
- G. 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 (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.
  8. For use only where concealed conduit in existing construction is not possible and is specifically approved by the Architect.
- 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. 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.
- B. 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.
- C. All conduit shall be routed in lines parallel to building lines.
- D. No conduit shall be installed closer than 6 inches to piping installed by other trades.
- E. 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.
- F. 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.
- G. 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>	<u>277/480 Volt</u>
1. Phase >A= conductor	Black	Brown
2. Phase >B= conductor	Red	Orange
3. Phase >C= conductor	Blue	Yellow
4. Neutral conductor	White	Grey
5. Grounding conductor	Green	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 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

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 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. Single pole-double-throw center off light switch - 15 amp, 120-277 volt, "Hubbell" No. 1381.
  - 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. Contractor shall confirm compatibility between the LED replacement lamp and dimmer provided.
  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.

2.08 CEILING RECESSED SPEAKER

- A. 8" dual cone with white ceiling grille.

2.09 SPEAKER VOLUME CONTROLLER

- A. Black rotary dial with 0-10 adjustment levels printed on stainless steel cover plate.

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 Document 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 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 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.

3.02 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 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.

2.05 LAMPS

- A. Provide lamps from one of the following manufacturers:
  - 1. General Electric.
  - 2. Westinghouse.
  - 3. Phillips.
  - 4. Sylvania.
  - 5. Hyperikon
- B. Furnish lamps for all fixtures as per schedule on drawings.
- C. LED lamps to meet the following minimum criteria:
  - 1. Color temperature shall be 4000°K min.
  - 2. System life rated to retain a minimum of 70% light output at 50,000 hours of use (L70 at 50,000 hours).
  - 3. Rated at CRI > 80.
- D. Provide lenses in recessed fixtures, as required by code, whether scheduled or not.

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 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.
- E. 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.
- F. 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.
- G. Make final connections between fixtures and wiring system.
- H. Replace any lamps which do not operate properly.

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 16741 – COMPUTER / PHONE CONDUIT SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The other contract Documents compliment the requirements of this Section. The General Requirements apply to the work of this section.

1.02 SCOPE

- A. Provide materials, equipment, labor and supervision necessary to install conduit system, for installation of Computer and phone service by Owner's separate Technology Contractor.
- B. Provide materials, equipment, labor and supervision necessary to install conduit system, for installation of data / phone devices by Owner's separate Technology Contractor, including all exterior service conduits, and conduits at each wall box indicated as a data outlet.
- C. Provide a telephone board and install complete. Coordinate with Owner's separate Technology Contractor.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Computer conduit system shall meet same basic requirements as Section 16111 – Conduit Systems.
- B. Computer terminal boards shall be 3/4" thick fire retardant plywood. Paint with two coats of interior enamel.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Consult with Owner's separate Technology Contractor prior to installing the service and conduit system and verify the exact requirements before proceeding with the work.
- B. Install a pull string in each Computer conduit for Owner's separate Technology Contractor's use.
- C. Install blank plates on any unused boxes.
- D. Unless otherwise noted all telephone outlets shall be stuffed to nearest accessible ceiling space with 3/4" conduit with a bushing at both ends.

END OF SECTION 16741



SECTION 16950 – LIGHTING SENSORS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment, special tools, supervision and services required to provide and complete all lighting sensor work on this Project as indicated, noted, detailed and scheduled on the drawings and specified herein.
- B. Generally includes the following:
  - 1. Ceiling Sensors.
  - 2. Wall Switch Sensors.
  - 3. Power Packs.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Division 1 - General Requirements  
Division 15 - Electrical  
Section 16500 - Lighting

1.03 QUALITY ASSURANCE

- A. All components shall be U.L Listed.
- B. All components shall meet all applicable requirements of the NEC and State and local Codes.
- C. All components shall be supplied by a single manufacturer that has been continuously involved in manufacture of lighting sensors for a minimum of (5) years.
- D. All components shall offer a minimum (5) year warranty.

1.04 SUBMITTALS

- A. Product Data:
  - 1. Manufacturer's published catalog data, cutsheets, literature, specifications and installation instructions.
  - 2. Indicate any load restrictions when used with electronic ballasts.
- B. Shop Drawings:
  - 1. Submit lighting plans indicating all sensor locations, types, orientations, etc.
  - 2. Submit any interconnection diagrams per major subsystem showing proper wiring required.

PART 2 - PRODUCTS

2.01 CEILING SENSORS (DUAL TECHNOLOGY-STANDARD RANGE)

- A. Provide one of the following approved products:
  - 1. "Acuity Brands"; Sensorswitch #CM PDT 10.
  - 2. "Watt Stopper"; #DT-300 Series, Standard Extended Range.
  - 3. "Eaton/Greengate"; #OAC-DT-2000.
- B. Description:
  - 1. Generally intended for use in rooms and areas 1,000 s.f. and larger.

2. Shall provide line-of-sight passive infrared (PIR) detection of small motion in a 360 degree circular pattern for detection of mobile occupants within the space and combine overlapping ultrasonic microphonics coverage for detection of occupants within the space either idle or located behind obstructions.
3. Low voltage.
4. Surface mounted to ceiling.
5. Shall not react to noise or ambient sound.

C. Options:

1. Provide "R" Low Voltage Relay. Only one relay required per zone.
2. Provide "D" Occupancy Controlled Dimming for all circuits requiring dimming fixtures. Only one sensor per zone required to have dimming output.

D. Color of device to be White.

2.02 CEILING SENSORS (DUAL TECHNOLOGY-CORRIDOR COVERAGE)

A. Provide one of the following approved products:

1. "Acuity Brands"; Sensorswitch #CM PDT 11.
2. "Watt Stopper"; #DT-300 Series, Standard Extended Range.
3. "Eaton/Greengate"; #OAC-DT-2000.

B. Description:

1. Generally intended for use in corridors.
2. Shall provide line-of-sight passive infrared (PIR) detection of large motion in a 360 degree circular pattern for detection of mobile occupants within the space and combine overlapping ultrasonic microphonics coverage for detection of occupants within the space either idle or located behind obstructions.
3. Low voltage.
4. Surface mounted to ceiling.
5. Shall not react to noise or ambient sound.

C. Color of device to be White.

2.03 WALL SWITCH SENSORS (DUAL TECHNOLOGY)

A. Provide one of the following approved products:

1. "Acuity Brands"; Sensorswitch #WSX PDT Series.
2. "Acuity Brands"; Sensorswitch #WSD PDT Series.
3. "Watt Stopper"; #DW-100 Series.
4. "Eaton/Greengate"; #ONW-D Series.

B. Description:

1. Shall provide line-of-sight passive infrared (PIR) detection of small motion in a 180 degree semi-circular pattern for detection of mobile occupants within the space and combine overlapping ultrasonic microphonics coverage for detection of occupants within the space either idle or located behind obstructions.
2. Capable for either 120 volt or 277 volt power.
3. Wall mounted within standard single-gang electrical box.
4. Shall not react to noise or ambient sound.
5. Field-selectable operation set per Owner's requirements.
6. Manual override buttons for field selectable option to change sensor operation from automatic sensor ON to manual ON.
7. Audible alert for impending shutoff.

8. Shall be capable of either Wiring To Neutral or Wiring To Ground (No Neutral).
9. Shall be capable of detection at a level 30" a.f.f. up to 300 s.f. and gross motion up to 1,000 s.f.

C. Color of device and wallplate to be selected from manufacturer's entire selection.

#### 2.04 SENSORS

##### A. General:

1. Shall be capable of operating normally with electronic ballasts, PL lamp systems, LED driver systems, and rated motor loads.
2. Shall provide an LED as a visual means of indication at all times to verify that motion is being detected during both testing and normal operation.
3. Shall have UL rated plastic enclosures.

##### B. Operation:

1. Coverage shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air conditioning or heating fans.
2. Shall have readily accessible and user adjustable settings for time delay and sensitivity. Settings shall be located on the sensor (not the control unit) and shall be recessed to limit tampering.
3. In the event of failure, a bypass manual override shall be provided on each sensor. When bypass is utilized, lighting shall remain on constantly or control shall divert to a wall switch until sensor is replaced. This control shall be recessed to prevent tampering.
4. Where indicated or where operation is required as intended, sensor shall have an internal additional isolated relay with Normally Open, Normally Closed, and Common outputs for use with HVAC control, Data Logging, BAS connectivity, Daylight Sensor connectivity, and other control options. Sensors utilizing separate components or specially modified units to achieve this function are not acceptable.

#### 2.05 POWER PACKS

##### A. Description:

1. Self-contained unit consisting internally of an isolated load switching control relay and a transformer to provide low-voltage power.
2. Universal voltage type.
3. Shall be rated for installation within ceiling plenums.
4. Provide units for low temperature or high humidity conditions where applicable.
5. Relay contacts shall be rated as follows:
  - a. 13A or 15A Tungsten @120 VAC.
  - b. 20A Ballast @120 VAC.
  - c. 20A Ballast @277 VAC.
  - d. 1HP Motor @120 VAC.
  - e. 2HP Motor @250 VAC.
  - f. Shall be available for 120, 220, 240, 277, and 347 VAC operation.

##### B. Manufacturer:

1. Manufacturer shall determine the appropriate power pack required for sensor or group of sensors, unless specific packs are selected. In that case, the manufacturer shall verify that the selected packs are applicable and most appropriate for intended installation.
2. Power packs shall be by the same manufacturer as the sensors, compatible with the sensors selected and provided as a complete and integral system.

##### C. Installation:

1. Provide power pack to serve each sensor or group of sensors as required.
2. Install concealed above ceiling or in adjacent room or space.

3. Control wiring between sensors and control units shall be Class II, 18-24 AWG, stranded UL Classified, PVC insulated or Teflon jacketed cable and plenum rated, where applicable.
4. Minimum acceptable wire gauge from the circuit control hardware relays shall be #14 AWG.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. It shall be the contractor's responsibility to locate and aim sensors in the correct location required for complete and proper volumetric coverage within the range of coverage(s) of controlled areas per the manufacturer's recommendations.
- B. Rooms shall have ninety (90) to one hundred (100) percent coverage to completely cover the controlled area to accommodate all occupancy habits of single or multiple occupants at any location within the room(s) for the intended use and occupancy.
- C. The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the rooms which are to be provided with sensors. The contractor shall provide additional sensors if required to properly and completely cover the respective room.
- D. It is the contractor's responsibility to arrange a pre-installation meeting with manufacturer's factory authorized representative, at owner's facility, to verify placement of sensors and installation criteria.
- E. The time delay settings for certain applications or rooms may need to be field adjusted up to the 30 minute time delay. Coordinate this work with the Owner, temperature controls contractor, mechanical contractor, electrical contractor or technology contractor where needed (i.e. restroom exhaust fans etc.).
- F. Proper judgment must be exercised in executing the installation so as to ensure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference of structural components.
- G. The contractor shall also provide, at the Owner's facility, the training necessary to familiarize the Owner's personnel with the operation, use, adjustment, and problem solving diagnosis of the occupancy sensing devices and systems.

#### SUBMITTAL CHECKLIST

1. Product Data.
2. Shop Drawings.

END OF SECTION 16950

SECTION 17050 – INTERIOR COMMUNICATION PATHWAYS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Interior Horizontal 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 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 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.
- 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. Manufacturer's catalog sheets and specifications for fiber and copper cable testers.
- B. Test Reports.

PART 2 - PRODUCTS

2.01 100 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.

2.02 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

#### 3.01 100 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).

#### 3.02 IDENTIFICATION AND LABELING

- A. Conform to specific labeling requirements outlined below during cable installation and termination.
- B. 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.
- C. 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.

3.03 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.

3.04 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. 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 17130 – HORIZONTAL CABLING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Horizontal cabling as required for the installation of the security surveillance system.
- B. All other horizontal cabling for data and phone system to be by Owner's separate technology contractor.
- C. This section also includes minimum requirements for the following:
  - 1. Category 6 UTP Cable.
  - 2. Ethernet and PoE Line Extenders.
  - 3. 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 NEC Article 770 and 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 400HMz 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. Coordinate cable color with Owner's separate technology contractor.

2.04 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.

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.

SUBMITTAL CHECKLIST

- 1. Product Data Sheets.
- 2. Test Results.

END OF SECTION 17130

SECTION 17910 – SECURITY 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 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. Basis of Specification: Manufacturer and Equipment:
  - 1. “Axis Communications”; Axis M30 Network Camera Series, #M3014.
- 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).

2.02 INTERIOR CAMERAS (LAY-IN CEILING TYPE – POINT OF ENTRY)

- A. Basis of Specification: Manufacturer and Equipment:
  - 1. “Axis Communications”; Axis P33 Network Camera Series, #P3364-V.
- 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).

2.03 INTERIOR CAMERAS (SURFACE-MOUNT TYPE)

- A. Basis of Specification: Manufacturer and Equipment:
  - 1. “Axis Communications”; Axis P33 Network Camera Series, #P3364-V.
- 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. Basis of Specification: Manufacturer and Equipment:
  - 1. “Axis Communications”; Axis P33 Network Camera Series, #P3367-VE.
- 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).

2.05 EXTERIOR CAMERAS (POST-MOUNT TYPE)

- A. Basis of Specification: Manufacturer and Equipment:
  - 1. “Axis Communications”; Axis P33 Network Camera Series, #P3367-VE.

- 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. Basis of Specification: Dell, Cisco or HP Server
- B. Description
  - 1. Rack Mounted
  - 2. RAID 6 storage
  - 3. Intel Core, 2 Quad, 2 Ghz+ processor
  - 4. 12 GB RAM, Minimum
  - 5. Hard drive storage capacity, 24 TB minimum
  - 6. 100/1000 Gigabit Ethernet Network Interface Card
- C. Appliance shall support:
  - 1. Complete network video security management
  - 2. Up to 50 IP Cameras
  - 3. Recording at full video resolution capability of cameras
  - 4. Recording rate up to 30 PPS per camera

2.07 NETWORK VIDEO MANAGEMENT SOFTWARE

- A. Acceptable Manufacturers:
  - 1. “Axis Communications”; Camera Station.
- 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.

2.08 NETWORK SWITCHES

- A. Smart Switch, Rack Mounted, 48 port, PoE
- B. PoE wattage as required for cameras supplied

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