

# Anderson County Government

## Request for Bids

100 North Main Street, Suite 214  
Courthouse  
Clinton, Tennessee 37716  
(865) 457-6218 Office  
(865) 457-6252 Fax

[purchasing@andersoncountyttn.gov](mailto:purchasing@andersoncountyttn.gov)

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### Bid #2521

Date Issued: December 18, 2024

Bids will be received until  
3:00 p.m. Eastern Time on January 30, 2024

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Sealed bids are subject to the General Terms and Conditions of this bid, and any other data attached or incorporated by reference. Bids will be received in the Anderson County Purchasing Office until the date and time specified above, and at that time publicly opened and read aloud.

ANDERSON COUNTY RESERVES THE RIGHT TO WAIVE ANY INFORMALITIES  
IN OR TO REJECT ANY OR ALL BIDS AND TO ACCEPT THE BID DEEMED  
FAVORABLE AND IN THE BEST INTEREST OF ANDERSON COUNTY.

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 12/18/24  
Robert J. Holbrook, Director of Finance

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BID DESCRIPTION
<p>New School for Claxton Elementary School Bid.</p> <p>A mandatory pre-bid meeting will take place on-site at 2:30pm on January 7, 2025.</p> <p><b>Bids must be in sealed envelopes with the Bid Cover Sheet and Contractor's License Number on the outside of the envelope.</b></p> <p>Questions are to be emailed to <a href="mailto:purchasing@andersoncountyttn.gov">purchasing@andersoncountyttn.gov</a> and <a href="mailto:kleehammer@andersoncountyttn.gov">kleehammer@andersoncountyttn.gov</a>.</p>

PROJECT MANUAL FOR:

# A NEW SCHOOL FOR: CLAXTON ELEMENTARY SCHOOL

105 FELLOWSHIP LANE  
POWELL, TN 37849

OWNER:

ANDERSON COUNTY SCHOOLS  
CONTACT: DR. TIM PARROTT, ED.D.  
101 S. MAIN STREET  
CLINTON, TN 37716

MBI JOB NO. 230042.02  
ANDERSON COUNTY BID #2521  
DECEMBER 13, 2024 – CONSTRUCTION DOCUMENTS

PROFESSIONALS OF RECORD:

WILLIAM B. STEVERSON, III, AIA – ARCHITECT

Phone No. 865-584-0999

W. NICHOLAS DEAL, PE, SE – STRUCTURAL ENGINEER

Phone No. 865-584-0999

JOHN C. BUCHANAN, PE – MECHANICAL ENGINEER

Phone No. 865-584-0999

STEVEN MICHAEL PICKETT, PE – ELECTRICAL ENGINEER

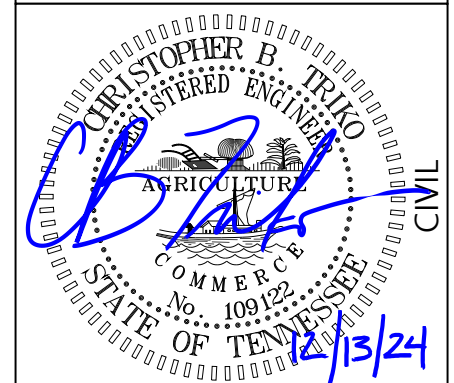
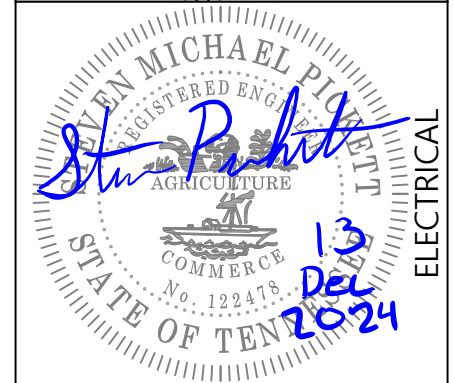
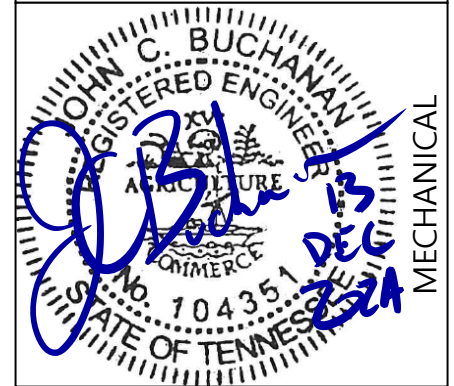
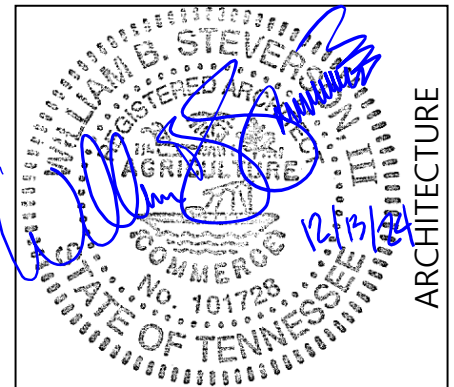
Phone No. 865-584-0999

CHRISTOPHER B. TRIKO, PE – CIVIL ENGINEER

Phone No. 865-584-0999

## MBI Companies Inc.

299 N WEISGARBER RD, KNOXVILLE, TN 37919  
865-584-0999 / Fax 865-584-5213  
www.mbicompanies.com





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Sealed bids for the construction of "A New School For: Claxton Elementary School, 105 Fellowship Lane, Powell, TN 37849" will be received at the office of:

Anderson County Finance Department  
100 North Main Street, Room 214  
Clinton, TN 37716-3687

until Thursday January 30, 2025 @ 3:00 p.m., at which time and place they will be publicly opened and read.

Drawings and Specifications and other Contract Documents may be examined at the following locations:

The office of the Architect – MBI Companies, Inc.; 299 N. Weisgarber Road, Knoxville, TN 37919  
Knoxville Builders Exchange of Tennessee, Tel: 866-941-BXTN (2986)  
Dodge Data & Analytics, Tel: 877-784-9556

A digital file, or file link, containing PDFs of the Contract Documents may be emailed to the general contractors for bidding purposes by calling the office of the Architect (MBI Companies, Inc.; 865-584-0999). General contractors will be added to the bidder's list only by contacting the office of the Architect. Bid deposit is not required. Subcontractors, vendors, and others who desire individual drawings and specification sections may obtain them from Knoxville Blueprint, Knoxville, Tennessee, 865-525-0463, by paying the costs of reproduction, which is not refundable. Addenda will be issued only to those parties obtaining digital files directly from the Architect. Bidders not obtaining files directly from the Office of the Architect do so at their own risk and will be held to the requirements of the documents and addenda as issued by that office.

Each bid must be accompanied by a Bid Security in the form of a Cashiers Check or a Bidders Bond, executed by the bidder and a surety company in the sum of not less than five percent (5%) of the total amount of the bid including all additive alternates, as a guarantee that, if the bid is accepted, the required contract will be executed and the required performance and payment bonds furnished. Bid Bond shall be executed on AIA Document A310. Said bond will be returned to the unsuccessful bidders as soon as the contract has been awarded and the successful bidder has executed the contract and furnished the necessary bonds and the contract has been executed by the Owner. Such bond shall be from a surety Company authorized to transact business in the State of Tennessee and Company shall be registered in Federal Register, Department of the Treasury, Fiscal Service, Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies; Notice. Attorneys in Fact who sign any bonds must file with each instrument a certified and effective dated copy of their power of attorney.

The successful bidder will be required to execute a performance bond in an amount equal to one hundred percent (100%) of the Contract Sum and a payment bond covering and including labor and materials in an amount equal to one hundred percent (100%) of the Contract Sum. Performance and Labor and Material Payment Bond shall be on AIA Form A312.

All bidders must be licensed contractors as required by the contractors Licensing Act of 1976, enacted by the General Assembly of the State of Tennessee on March 18, 1976 and as amended to date as codified by Tennessee Code Annotated (TCA) Sections §62-6-119. Bidder's name, license number, date of expiration of license, license limit, and that part of license classification applying to the bid must be placed on the envelope containing the bid, otherwise the bid cannot be opened or considered. As applicable by Tennessee Annotated Code and/or TDEC regulations, the names of the Mechanical, Plumbing, Electrical, Masonry, Roofing and/or Geothermal Subcontractors, License numbers, date of expiration of their licenses, license limit, and license classification must also be on the bid envelopes otherwise the bid cannot be opened or considered. General Contractors performing Mechanical, Plumbing, Electrical, Masonry, Roofing and/or Geothermal work must designate this information on the outside of the envelope.

Each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each bidder is not a person included within or on the list created pursuant to TCA §12-12-106.

No bidder will be permitted to withdraw his bid within sixty (60) days after the date of opening of bids. The Owner reserves the right to reject any or all bids and to waive any informalities therein.

A Prebid Conference will be held Tuesday January 7, 2025 at 2:30pm local time at the project site, 105 Fellowship Lane, Powell, TN 37849. Attendance at this Prebid Conference is mandatory for Prime Bidders; and optional for HVAC, Plumbing, and Electrical Sub-bidders. Representatives of the Owner, the Architect, and Architect's Engineering Consultants will be present to describe and explain the scope of the work to be bid and to answer questions. Representative of all Subcontractors bidding are invited and urged to attend.

Upon award of the construction contract to the successful bidder, construction shall commence on a date to be specified in the "Notice to Proceed" to the Contractor and shall be completed on or before the completion date specified in the Contract Documents as time is of the essence in the performance of the contract for construction.

Upon receipt of Notice to Proceed, the Contractor will complete the work regularly, diligently, and uninterruptedly at such rate of progress as will ensure full completion thereof within the time specified on the Bid Form.

The Owner reserves the right to waive any information in or to reject any or all bids and to accept the bid deemed favorable to the interest of the Owner.

END OF SECTION

# AIA® Document A701® – 2018

## Instructions to Bidders

for the following Project:

*(Name, location, and detailed description)*

A New School For: Claxton Elementary School  
105 Fellowship Lane  
Powell, TN 37849

A new STEM elementary school of approximately 124,000 square feet to include four classrooms each for K-5, Administration area, Cafeteria, Gymnasium, Auditorium, Media Center, CDC, STEM, Art, Music, Daycare, and common core.

MBI Comm. No.: 230042.02  
Anderson County Bid # 2521

### THE OWNER:

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

Anderson County School Board  
Contact: Dr. Tim Parrott, Ed.D.  
101 S. Main Street  
Clinton, TN 37716

### THE ARCHITECT:

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

MBI Companies Inc., Architect  
299 N. Weisgarber Road  
Knoxville, TN 37919

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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.

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

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

## ARTICLE 1 DEFINITIONS

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

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

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

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

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

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

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

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

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

## ARTICLE 2 BIDDER'S REPRESENTATIONS

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

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

## ARTICLE 3 BIDDING DOCUMENTS

### § 3.1 Distribution

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

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

A digital file, or file link, containing PDFs of the Contract Documents may be emailed to the general contractors for bidding purposes by calling the office of the Architect (MBI Companies, Inc.; 865-584-0999). General contractors will be added to the bidder's list only by contacting the office of the Architect. Subcontractors, vendors, and others who desire

individual drawings and specification sections may obtain them from Knoxville Blueprint, Knoxville, Tennessee; (865-525-0463) by paying the costs of reproduction, which is not refundable. Addenda will be issued only to those parties obtaining digital files directly from the Architect. Bidders not obtaining files directly from the Office of the Architect do so at their own risk and will be held to the requirements of the documents and addenda as issued by that office.

**§ 3.1.2** Bid deposit is not required.

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

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

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

**§ 3.2 Modification or Interpretation of Bidding Documents**

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

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

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

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

**§ 3.3 Substitutions**

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

**§ 3.3.2 Substitution Process**

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

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

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

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

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

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

#### § 3.4 Addenda

§ 3.4.1 Addenda will be transmitted to Bidders known by the issuing office to have received complete Bidding Documents.

*(Indicate how, such as by email, website, host site/platform, paper copy, or other method Addenda will be transmitted.)*

§ 3.4.2 Addenda will be issued only to those parties obtaining digital files directly from the Architect.

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

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

### ARTICLE 4 BIDDING PROCEDURES

#### § 4.1 Preparation of Bids

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

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

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

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

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

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

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

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

#### § 4.2 Bid Security

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

*(Insert the form and amount of bid security.)*

Cashier's Check or Bidder's Bond for 5 percent of the total amount of the bid including all additive alternates.

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

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

§ 4.2.4 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning 60 days after the opening of Bids, withdraw its Bid and request the return of its bid security.

### § 4.3 Submission of Bids

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

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

Submit the bid, with bid cover attached, to:

Anderson County Finance Department  
Anderson County Courthouse  
100 North Main Street, Suites 214 and 218  
Clinton, TN 37716

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

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

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

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

### § 4.4 Modification or Withdrawal of Bid

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

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

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

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

## **ARTICLE 5 CONSIDERATION OF BIDS**

### **§ 5.1 Opening of Bids**

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

### **§ 5.2 Rejection of Bids**

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

### **§ 5.3 Acceptance of Bid (Award)**

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

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

## **ARTICLE 6 POST-BID INFORMATION**

### **§ 6.1 Contractor's Qualification Statement**

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request and within the timeframe specified by the Architect, a properly executed AIA Document A305™, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted for this Bid. Bidder shall also provide a current financial statement proving financial solvency and also provide information regarding any currents or past litigation within the last 5 years. If a bidder has or has had litigation, provide brief explanation and outcome.

### **§ 6.2 Owner's Financial Capability**

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

### **§ 6.3 Submittals**

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

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

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

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

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

## ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

### § 7.1 Bond Requirements

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

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

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

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

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

### § 7.2 Time of Delivery and Form of Bonds

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

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

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

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

## ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

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

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

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

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

.4

*(Paragraphs deleted)*

Drawings

Number		Title	Date	
As noted in List of Drawings				
.5	Specifications			
Section		Title	Date	Pages
As noted in Table of Contents				
.6	Addenda:			
Number		Date	Pages	
.7	Other Exhibits:			
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)				
(Paragraphs deleted)				
(Row deleted)				
[ X ] Supplementary and other Conditions of the Contract:				
Document		Title	Date	Pages
As noted in Table of Contents				
(Paragraphs deleted)				

PART 1 GENERAL

1.01 GENERAL

- A The following amendments modify, change, delete from or add to the Instructions to Bidders (AIA Document A701, 2018 Edition). Where any part of the Instructions to Bidders is modified or voided by these amendments, the unaltered provisions of that part shall remain in effect.

1.02 BID SECURITY

- A Bid security shall be in the form of a bid bond secured by a Surety Company or a Cashier's Check and shall be in the amount of not less than five percent (5%) of the amount of the bid.

1.03 SUBMISSION OF BIDS

- A If the bids will be emailed, in addition to the information listed in Subparagraph 4.3.1, the email containing the bid shall include the plainly marked bid envelope PDF with the bidding contractor's license number, date of expiration of the license, license limitation, and that part of license classification applying to the bid. If this information is not marked on the bid envelope PDF, the Architect and the Owner are prohibited from considering the bid by the requirements of The contractor's Licensing Act of 1976 enacted by the General Assembly of the State of Tennessee, as amended by Chapter 9 and Chapter 406 of the Public Acts of 1977. The names of the Masonry, Roofing, Geothermal, Plumbing, Mechanical, and Electrical Subcontractors, License numbers and date of expiration of their licenses must also be on the bid envelope PDF.

- B Notes: Bidders' attention is called to the provisions of the Contractor's Licensing Act that particular subcontractors (Electrical, Mechanical, HVAC, Masonry, Roofing, Geothermal, etc.) must have a contractor's license if the aggregate amount of their subcontract is equal to or exceeds monetary limits enumerated in that Act for each subcontractor's trade.

1.04 CONTRACT FOR CONSTRUCTION

- A The Contract for Construction of the Project will be executed on AIA Document A101, current version.

1.05 PERFORMANCE AND LABOR AND MATERIALS PAYMENT BOND

- A The successful bidder will be required to furnish a Performance Bond and a Labor and Materials Payment Bond in the amount of one hundred percent (100%) of the contract sum. Bonds shall be executed on AIA Document A312.

1.06 DEFINITIONS

- A All definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201 - 2017 Edition, are applicable to these Instructions to Bidders.

- B Bidding documents include the Invitation to Bid, Instructions to Bidders, the Bid Forms, Agreement between Owner and Contractor and the proposed Contract Documents including any Addenda issued prior to receipt of Bids.

- C Addenda are written or graphic instruments issued prior to the execution of the Contract which modify or interpret the bidding documents, including Drawings and Specifications, by additions, deletions, clarifications or corrections. Addenda will become part of the Contract Documents when the Construction Contract is executed.

- D All correspondence concerning the bid process shall be addressed to the Architect.

- E A Bid is a complete and properly signed proposal to do the Work or designated portion thereof for the sums stipulated therein, submitted in accordance with the Bidding Documents.
- F 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 any Alternate Bids.
- G A Bidder is a person or entity who submits a Bid.
- H A Sub-Bidder is a person or entity who submits a bid to a Bidder for materials or labor for a portion of the Work.

1.07 EXAMINATION OF DOCUMENTS AND SITE

- A. Each Bidder, by making his Bid, represents that he has read and understands the Bidding Documents.
- B. Each Bidder, by making his Bid, represents that he has visited the site and familiarized himself with the local conditions under which the Work is to be performed.
- C. Each Bidder, by making his Bid, represents that his Bid is based upon the materials, systems and equipment required by the Bidding Documents unless exceptions are noted on the Bid Form.

1.08 BIDDING PROCEDURES

- A. All Bids shall be prepared on the included forms and submitted in accordance with the Instructions to Bidders.
- B. A Bid is invalid if it has not been received prior to the time and date for receipt of bids indicated in the Invitation to Bid, or prior to any extension thereof issued to the Bidders.
- C. Unless otherwise provided in any supplement to these Instructions to Bidders, no bidder shall modify, withdraw or cancel his Bid or any part thereof for sixty (60) days after the time designated for the receipt of Bids in the Invitation to Bid.
- D. Prior to the receipt of Bids, Addenda will be emailed to each person or firm recorded by the Architect and Engineer as having received the Bidding Documents. Addenda issued after receipt of Bids will be mailed or delivered only to the selected Bidder.
- E. Bids shall not contain any recapitulation of the Work (except as noted on the Bid Form) to be done and no oral or telephone proposals or modifications will be considered.
- F. The Bidder shall make no additional stipulations on the Bid Form or limit or qualify his Bid in any other manner. Bids so qualified will be subject to disqualification.
- G. Only written instructions will be binding. The Architect or Engineer will not be responsible for any oral, or telephonic instructions.
- H. The names of all Subcontractors and material suppliers proposed to be employed shall be submitted for approval by the Owner before they are employed, and all such Subcontractors and material suppliers must be known to perform work of a high standard in their respective trades. If the Owner has reasonable objection to any such proposed person or entity, and notifies the Bidder in writing of such objection, the Bidder shall provide an acceptable substitute person or entity in accordance with Article 5.2 of the General Conditions.

1.09 DISCREPANCIES AND AMBIGUITIES

- A. Each Bidder shall examine the Bidding Documents carefully and, not later than ten (10) days prior to the date for receipt of Bids, shall make written request to the Architect or Engineer via email only, for interpretations or correction of any ambiguity, inconsistency or error therein which he may discover. The Architect or Engineer will issue any interpretation or correction as an Addendum. Only a written interpretation or correction by Addendum shall be binding. No Bidder shall rely upon any interpretation or correction given by any other method.

1.10 SUBSTITUTIONS

- A. Each Bidder represents that his Bid is based upon the materials and equipment described in the Bidding Documents.
- B. Where products or systems are specified by naming only one manufacturer and no provisions for substitutions are listed, no substitutions are allowed. Where substitution provisions are listed, they will only be considered if approved by Addenda prior to Bidding.

1.11 QUALIFICATION OF BIDDERS

- A. A Bidder shall submit to the Owner a properly executed Contractor's Qualification Statement, AIA Document A305 and/or properly documented experience record.
- B. Bidders may be disqualified, and their Bids not considered for any of the following specific reasons:
  - 1. Reason for believing collusion exists among Bidders.
    - a. Submit Non-Collusion Affidavit of Subcontractors after bid. Completion of this form by each subcontractor is required before issuance of Notice to Proceed.
  - 2. The Bidder being interested in any litigation against the Owner.
  - 3. The Bidder being in arrears on any existing contract or having defaulted on a previous contract.
  - 4. Lack of competency as revealed by the financial statement, experience and equipment, questionnaires, or qualification statement.
  - 5. Uncompleted work which in the judgment of the Owner will prevent or hinder the prompt completion of additional work if awarded.
- C. A Bidder shall submit to the Owner a confidential Financial Statement in a sealed envelope.

END OF SECTION



PART 1 GENERAL

1.01 PURPOSE

- A. This section identifies information that was gathered solely for the use of the Designer, is not a Bidding Document, but is available for review by Bidders. Bidders have the entire responsibility for their interpretation and use of this information and shall not rely on the information for the preparation of a bid.

1.02 INFORMATION AVAILABLE

- A. Report of Geotechnical Information.
- B. Kitchen design drawings.

1.03 ACCESS TO INFORMATION

- A. Bidders may access information by contacting the office of the Architect. Digital files will be transmitted to bidder requesting information.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION



By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each bidder is not a person included within the list created pursuant to Tennessee Code Annotated §12-12-106.

Authorizing Signature: \_\_\_\_\_  
(Sign in BLUE ink)

END OF SECTION



TO: Anderson County Finance Department  
Attention: Katherine Kleehammer  
Anderson County Courthouse  
100 North Main Street, Room 214  
Clinton, TN 37716-3687

DATED: \_\_\_\_\_, 2025

Having carefully examined the Invitation and Instructions to Bidders, the General Conditions of the Contract and Specifications entitled “A New School For: Claxton Elementary School, 105 Fellowship Lane, Powell, TN 37849” and the Drawings similarly entitled, as well as the premises and conditions affecting the work, the Undersigned proposes to furnish all materials and labor called for by them for the work in accordance with said documents for the sum of:

\_\_\_\_\_ Dollars (\$\_\_\_\_\_).

hereinafter referred to as the Base Bid.

The Bidder hereby acknowledges that the following documents are attached to and made a condition of this Bid:

- |   |  |
|---|--|
| a) Required Bid Security in the form of: 5% Bid Bond. | b) Attachment 1: Non-Collusion Affidavit               |
| c) Attachment 2: Diversity Business Information       | d) Attachment 3: Insurance Requirement Acknowledgement |
| e) Attachment 4: Conflict of Interest Form            | f) Attachment 5: Background Check Compliance Form      |
| g) Attachment 6: Drug Free Workplace Affidavit.       | h) Subcontractor and Supplier List                     |
| k) Specification Compliance Form                      | j) Authorization to do Business in Tennessee           |

Please be advised that the following items are owner provided and not to be included in the General Conditions of the Contract. The Owner will purchase and install the following items themselves and they are not to be included in the Bid or Alternate pricing.

1. Computer cabling

The Bidder sets forth the following Unit Prices, including delivery, installation, insurance, overhead, taxes, profit, etc. as a price per indicated unit of measurement for materials and/or services to be added to or deducted from the Contract Sum by appropriate modifications during construction.

Unit Price on Removing and Replacing Unsuitable Soil in Mass Excavation	_____	Per Cu. Yd.
Unit Price for Removing and Replacing Unsuitable Soile in Trench Excavation	_____	Per Cu. Yd.
Unit Price for Solid Rock Excavation and disposal in connection with the Mass Excavation	_____	Per Cu. Yd.
Unit Price for Solid Rock Excavation and disposal in connection with Trench Excavation.	_____	Per Cu. Yd.

Unit Price for providing and installing Compacted Stone

Cost for providing Emergency Responder Radio  
Antenna-Repeater System

Per Cu. Yd.

System

If written notice of the acceptance of this bid is mailed, emailed, or delivered to the Undersigned within sixty (60) days after the date of receipt of bids or at anytime thereafter before this bid is withdrawn, the Undersigned agrees that he will execute and deliver a Contract on the forms which will be provided him in accordance with bid as specified; and that he will give performance and payment bonds as specified with good and sufficient surety or sureties all within ten (10) days, unless a longer period is allowed after the prescribed forms are presented to him for signature.

The Bidder proposes to complete the work within \_\_\_\_\_ consecutive calendar days from the Notice to Proceed. The Bidder, by submitting this Bid, agrees to furnish labor, materials, equipment, etc., necessary to complete the work by the above stated dates and to accept the conditions for liquidated damages in the amount of **Five Hundred Dollars (\$500.00)** per calendar day. The above stated dates for completion of this project are of utmost importance to the Owner.

The Undersigned hereby acknowledges receipt of all Contract Documents including all pages of the Specifications, all sheets of the Drawings, and the following Addenda:

Addendum No. ____ Date: _____	Addendum No. ____ Date: _____
Addendum No. ____ Date: _____	Addendum No. ____ Date: _____
Addendum No. ____ Date: _____	Addendum No. ____ Date: _____

Sincerely,

\_\_\_\_\_  
Bidder (If by a Corporation, this Bid must have the Signature Required by its By-Laws)

\_\_\_\_\_  
Title

\_\_\_\_\_  
Firm Name

\_\_\_\_\_  
State of Incorporation

\_\_\_\_\_  
State License No.

\_\_\_\_\_  
Official Address

END OF BID FORM

**THIS FORM MUST BE FIRMLY ATTACHED TO THE OUTSIDE OF THE ENVELOPE CONTAINING THE BID. NO BID WILL BE CONSIDERED IF THIS FORM IS INCOMPLETE OR NOT ATTACHED TO THE OUTSIDE OF THE BID ENVELOPE.**

<b>To:</b>	Attention: Katherine Kleehammer Anderson County Finance Department Anderson County Courthouse 100 North Main Street, Room 214 Clinton, TN 37716-3687	<b>PROJECT:</b>	A New School For: Claxton Elementary School 105 Fellowship Lane Powell, TN 37849
<b>DATE:</b>		<b>TIME:</b>	
<b>LOCATION:</b>			

<b>NAME OF BIDDER:</b>		<b>BIDDER'S LICENSE CLASSIFICATION:</b>	
<b>LICENSE NO.:</b>	(If bidder is licensed in more than one classification that applies to work being bid, include the license number, classification & expiration date of all classifications)	<b>EXPIRATION DATE:</b>	
		<b>MONETARY LIMITS:</b>	

**PART II: IF THE BID INVOLVES: (1) ELECTRICAL WORK, (2) PLUMBING WORK, (3) HEATING, VENTILATION OR AIR CONDITIONING WORK, (4) MASONRY WORK, (5) ROOFING WORK OR (6) GEOTHERMAL WORK, THE BIDDER MUST COMPLETE PART II. IF NOT, ENTER "NONE" IN THE SPACE FORM ITEM (A) BELOW.**

<b>Electrical</b>	<b>Plumbing</b>	<b>HVAC</b>	<b>Masonry</b>	<b>Roofing</b>	<b>Geothermal</b>
A. Name of Sub holding electrical license:	A. Name of Sub holding plumbing license:	A. Name of Sub holding HVAC license:	A. Name of Sub holding Masonry license:	A. Name of Sub holding Roofing license:	A. Name of Sub holding Geothermal license:
B. License No. of Contractor holding electrical license:	B. License No. of Contractor holding plumbing license:	B. License No. of Contractor holding HVAC license:	B. License No. of Contractor holding Masonry license:	B. License No. of Contractor holding Roofing license:	B. TDEC Lic.No. of Contractor holding Geothermal license:
C. License classification and limits:	C. License classification and limits:	C. License classification and limits:	C. License classification and limits:	C. License classification and limits:	C. TDEC License classification and limits:
D. Expiration date of electrical license:	D. Expiration date of plumbing license:	D. Expiration date of HVAC license:	D. Expiration date of Masonry license:	D. Expiration date of Roofing license:	D. Expiration date of Geothermal license:



**Attachment 1**  
**BID NUMBER: 2521 - A New School For: Claxton Elementary School**

**SECTION 1 - BID INFORMATION**

Acknowledgment of Addenda:

(Write "Yes" if received)

Addenda 1 \_\_\_\_\_ Addenda 2 \_\_\_\_\_  
Addenda 3 \_\_\_\_\_ Addenda 4 \_\_\_\_\_

**SECTION 2 - VENDOR INFORMATION**

Vendor Name \_\_\_\_\_

Vendor Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

Zip \_\_\_\_\_

Telephone Number \_\_\_\_\_

Contact Person *(Please Print)* \_\_\_\_\_

E-Mail Address \_\_\_\_\_

Taxpayer Identification Number, Social Security or  
Employer Identification Number: \_\_\_\_\_

State of Tennessee Business License Number:  
License # \_\_\_\_\_

**I agree to abide by all Terms and Conditions of this  
Invitation to Bid and certify that I am authorized to sign  
this bid for the vendor. Failure to include any  
information mentioned in the bid or to comply with  
these bid instructions may result in rejection of your  
entire bid. Signing this form affirms that the original  
Invitation for Bid document has not been altered in any  
way.**

**Authorizing Signature:**

\_\_\_\_\_  
(Please sign original in blue ink)



Attachment 2

**Non-Collusion Affidavit**

- This Non-Collusion Affidavit is material to any contract awarded pursuant to this bid.
- This Non-Collusion Affidavit must be executed by the member, officer, or employee of the bidder who makes the final decision on prices and the amount quoted in the bid.
- Bid rigging and other efforts to restrain competition and the making of false sworn statements in connection with the submission of bids are unlawful and may be subject to criminal prosecution. The person who signs the affidavit should examine it carefully before signing and assure himself or herself that such statement is true and accurate, making diligent inquiry, as necessary, of all other persons employed by or associated with the bidder with responsibilities for the preparation, approval, or submission of the bid.
- In the case of a bid submitted by a joint venture, each party to the venture must be identified in the bid documents, and an affidavit must be submitted separately on behalf of each party.
- The term "complementary bid" as used in the affidavit has the meaning commonly associated with that term in the bidding process and includes the knowing submission of bids higher than the bid of another firm, an intentionally high or noncompetitive bid, and any other form of bid submitted for the purpose of giving a false appearance of competition.
- Failure to file an affidavit in compliance with these instructions may result in disqualification of the bid.

**Non-Collusion Affidavit**

STATE OF \_\_\_\_\_

COUNTY OF \_\_\_\_\_

I state that I am (Title) \_\_\_\_\_ of (Name of My Firm) \_\_\_\_\_ and that I am authorized to make this affidavit on behalf of my firm and its owners, directors, and officers. I am the person responsible in my firm to the price(s) and the amount of this bid.

**I STATE THAT:**

- The price(s) and amount of this bid have been arrived at independently and without consultation, communication, or agreement with any other contractor, bidder, or potential bidder.
- Neither the price(s) nor the amount of this bid and neither the approximate price(s) nor approximate amount of this bid, have been disclosed to any other firm or person who is a bidder or potential bidder, and they will not be disclosed before bid opening.
- No attempt has been made or will be made to induce any firm or person to refrain from bidding on this contract, or to submit a bid higher than this bid, or to submit any intentionally high or noncompetitive bid or other form of complementary bid.
- The bid of my firm is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary or other noncompetitive bid.
- (Name of My Firm) \_\_\_\_\_, its affiliates, subsidiaries, officers, directors, and employees are not currently under investigation by any governmental agency and have not in the last three years been convicted or found liable for any act prohibited by State or Federal law in any jurisdiction involving conspiracy or collusion with respect to bidding on any public contract, except as follows:  
\_\_\_\_\_  
\_\_\_\_\_

I state that (Name of My Firm) \_\_\_\_\_ understands and acknowledges that the above representation are material and important and will be relied on by Anderson County in awarding the contract(s) for which this bid is submitted. I understand and my firm understands that any misstatement in this affidavit is and shall be treated as fraudulent concealment from Anderson County of the true facts relating to submission of bids for this contract.

\_\_\_\_\_  
Representative's Signature

\_\_\_\_\_  
Title

Sworn to and subscribed before me this \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

\_\_\_\_\_  
Notary Public

My commission expires: \_\_\_\_\_





## DIVERSITY BUSINESS INFORMATION

### Definitions for Determining Minority, Women And Small-Owned Firms

The guidelines for determining minority, women and small-owned firms are defined as follows:

**"MINORITY"** means a person who is a citizen or lawful permanent resident of the United States and who is:

- o Black (a person having origins in any of the black racial groups of Africa);
- o Hispanic (a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race);
- o Asian American (a person having origins in any of the original peoples of the Far East, Southeast
- o Asia, the Indian subcontinent, or the Pacific Islands); or
- o American Indian and Alaskan Native (a person having origins in any of the original peoples of North America).

**"MINORITY BUSINESS ENTERPRISE"** shall mean a minority business:

A continuing, independent, for profit business which performs a commercially useful function, and is at least 51 percent owned and controlled by one or more minority individuals; or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned and controlled by one or more minorities. Whose management and daily business operations are controlled by one or more of minority individuals. "Control" as used in the above clause, means exercising the power to make policy decision. "Operate," as used in the above clause, means being actively involved in the day-to-day management of the business.

**"WOMEN BUSINESS ENTERPRISE"** shall mean women business:

A continuing, independent, for profit business which performs a commercially useful function, and which is at least 51 percent owned and controlled by one or more women; or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned and controlled by one or more women. Whose management and daily business operations are controlled by one or more of such individuals. "Control" as used in the above clause, means exercising the power to make policy decision. "Operate," as used in the above clause, means being actively involved in the day-to-day management of the business.

Attachment 3

**DIVERSITY BUSINESS INFORMATION  
ANDERSON COUNTY GOVERNMENT**

**NOTE:** This form is to be submitted only by those who qualify. Bidders do not have to be a minority business to be considered.

**IMPORTANT! NOTARY AND COPY OF CERTIFICATION REQUIRED**

**SECTION 6 – DIVERSITY INFORMATION**

**VENDOR/CONTRACTOR NAME:** \_\_\_\_\_

**Type of Company:** (Check One)

**(\_\_\_\_) Corporation    (\_\_\_\_) Partnership    (\_\_\_\_) Limited Liability    (\_\_\_\_) Sole Proprietor**

Is your company 51% Owned or Operated by a Minority Group? Yes \_\_\_\_ No \_\_\_\_

If yes, check the ethnic category and indicate % of ownership:

- ☐ American Indian/Alaskan Native \_\_\_\_%  
☐ African American \_\_\_\_%  
☐ Hispanic \_\_\_\_%  
☐ Asian/Pacific Islander \_\_\_\_%  
☐ Other \_\_\_\_% \_\_\_\_\_ (please indicate)

Please name the entity of certification: \_\_\_\_\_

Please provide copy of certification letter or certificate

**I, HEREBY CERTIFY THAT THE ABOVE INFORMATION IS TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.**

**Signature:** \_\_\_\_\_ **OFFICER OF THE COMPANY**

**Name:** \_\_\_\_\_ **Title:** \_\_\_\_\_

**NOTARY ACKNOWLEDGEMENT:**

STATE OF \_\_\_\_\_ )

COUNTY OF \_\_\_\_\_ )

ON \_\_\_\_\_, 20\_\_\_\_, BEFORE ME, \_\_\_\_\_,

PERSONALLY APPEARED \_\_\_\_\_, PERSONALLY KNOWN TO ME (OR PROVED TO ME ON THE BASIS OF SATISFACTORY EVIDENCE) TO BE THE PERSON(S) WHOSE NAME(S) IS/ARE SUBSCRIBED TO THE WITHIN INSTRUMENT AND ACKNOWLEDGED TO ME THAT HE/SHE/ THEY EXECUTED THE SAME IN HIS/HER/THEIR AUTHORIZED CAPACITY(IES), AND THAT BY HIS/HER/THEIR SIGNATURE(S) ON THE INSTRUMENT THE PERSON(S), OR THE ENTITY UPON BEHALF OF WHICH THE PERSON (S) ACTED, EXECUTED THE INSTRUMENT.

WITNESS MY HAND AND OFFICIAL SEAL.

SIGNATURE OF NOTARY: \_\_\_\_\_

PRINTED FULL NAME OF NOTARY: \_\_\_\_\_

MY COMMISSION EXPIRES: \_\_\_\_\_

**Attachment 4**  
**Insurance Requirement Acknowledgment**

The bidder awarded this bid or contract will maintain, at their expense adequate insurance coverage to protect them from claims arising under the Worker's Compensation Act, any and all claims for bodily injury and property damage to the Bidder and to Anderson County Government while delivery and service are being done. A certificate of insurance must be on file in the Purchasing Department before work may begin and must be maintained until work is completed.

Only the items marked with an "X" are applicable to this bid and or contract.

- |    |  |   |
|----|--|---|
| 1. | <input checked="" type="checkbox"/> <b>Workers Compensation<br/>Employers Liability</b>  | Statutory limits<br>100,000/100,000/500,000       |
| 2. | <input checked="" type="checkbox"/> <b>Commercial General Liability</b>  | \$500,000 per occurrence<br>\$1,000,000 aggregate |
|    | <input checked="" type="checkbox"/> Occurrence Form Only   |   |
|    | <input checked="" type="checkbox"/> Include Premises Liability   |   |
|    | <input checked="" type="checkbox"/> Include Contractual  |   |
|    | <input checked="" type="checkbox"/> Include XCU  |   |
|    | <input checked="" type="checkbox"/> Include Products and Completed Operations  |   |
|    | <input checked="" type="checkbox"/> Include Personal Injury  |   |
|    | <input checked="" type="checkbox"/> Include Independent Contractors  |   |
|    | <input checked="" type="checkbox"/> Include Vendors Liability  |   |
|    | <input checked="" type="checkbox"/> Include Professional or E&O Liability  |   |
| 3. | <input type="checkbox"/> <b>Business Auto</b>  |   |
|    | <input type="checkbox"/> Include Garage Liability  |   |
|    | <input type="checkbox"/> Include Garage Keepers Liability  |   |
|    | <input type="checkbox"/> Copy of Valid Driver's License  |   |
|    | <input type="checkbox"/> Copy of Current Motor Vehicle Record  |   |
|    | <input type="checkbox"/> Copy of Current Auto Liability Declarations Page  |   |
| 4. | <input type="checkbox"/> <b>Crime Coverages</b>  |   |
|    | <input type="checkbox"/> Employee Dishonesty   |   |
|    | <input type="checkbox"/> Employee Dishonesty Bond  |   |
| 5. | <input type="checkbox"/> <b>Property Coverages</b>   |   |
|    | <input type="checkbox"/> Builders Risk   |   |
|    | <input type="checkbox"/> Inland Marine   |   |
|    | <input type="checkbox"/> Transportation  |   |
| 6. | <input checked="" type="checkbox"/> Performance Bond Required – A <u>One Hundred Percent (100%)</u> performance or an irrevocable letter of credit in favor of Anderson County Government at a federally insured financial institution in accordance with T.C.A. 12-4-201. This <u>MUST</u> be submitted before purchase order issued. <b>REQUIRED IF BID IS OVER \$100,000.</b> |   |

**Certificate Holder Shall Be:** Anderson County Government, Clinton, Tennessee, and shall show the bid number and title. Anderson County Government shall be named as an additional insured on all policies except worker's compensation and auto. Insurance carrier ratings shall have a Best's rating of A-VII or better, or its equivalent. Cancellation clause on certificate should strike out "endeavor to" and include a 30-day notice of cancellation where applicable. Any deviations from the above requirements must be disclosed to the Anderson County Purchasing Agent. Any liability deductibles or exclusions must also be disclosed. Exceptions can be granted if applicable.

**Bidders Statement and Certification**

I understand the insurance requirements of these specifications and will comply in full within **21 (twenty-one) calendar days** if awarded this bid and or contract. I agree to furnish the county with proof of insurance for the entire term of the bid and or contract.

\_\_\_\_\_  
**Vendor Name**

\_\_\_\_\_  
**Bid Representative Name (Please Print)**

\_\_\_\_\_  
**Authorized Signature**

\_\_\_\_\_  
**Date**



**Attachment 5**  
**ANDERSON COUNTY GOVERNMENT**  
**PURCHASING DEPARTMENT**

**CONFLICT OF INTEREST AFFIDAVIT/STATEMENT**

**NOTE: PLEASE SIGN AND RETURN PAGE TWO IN YOUR BID PACKET.**

**T. C. A. 5-14-114. Conflicts of interest -- Illegal payments.**

**(a)** Neither the county purchasing agent, nor members of the county purchasing commission, nor members of the county legislative body, nor other officials of the county, shall be financially interested, or have any personal beneficial interest, either directly or indirectly, in any contract or purchase order for any supplies, materials, equipment or contractual services used by or furnished to any department or agency of the county government.

**(b)** Nor shall any such persons accept or receive, directly or indirectly, from any person, firm or corporation to which any contract or purchase order may be awarded, by rebate, gift or otherwise, any money or anything of value whatsoever, or any promise, obligation or contract for future reward or compensation.

**(c)** A violation of this section is a Class D felony.

**T. C. A. 12-4-101 Personal interest of officers prohibited.**

**(a) (1)** It is unlawful for any officer, committee member, director, or other person whose duty it is to vote for, let out, overlook, or in any manner to superintend any work or any contract in which any municipal corporation, county, state, development district, utility district, human resource agency, or other political subdivision created by statute shall or may be interested, to be directly interested in any such contract. "Directly interested" means any contract with the official personally or with any business in which the official is the sole proprietor, a partner, or the person having the controlling interest. "Controlling interest" includes the individual with the ownership or control of the largest number of outstanding shares owned by any single individual or corporation. This subdivision (a)(1) shall not be construed to prohibit any officer, committee person, director, or any person, other than a member of a local governing body of a county or municipality, from voting on the budget, appropriation resolution, or tax rate resolution, or amendments thereto, unless the vote is on a specific amendment to the budget or a specific appropriation or resolution in which such person is directly interested.

**(2) (A)** Subdivision (a)(1) shall also apply to a member of the board of directors of any not-for-profit corporation authorized by the laws of Tennessee to act for the benefit or on behalf of any one (1) or more counties, cities, towns and local governments pursuant to title 7, chapter 54 or 58.

**(B)** Subdivision (a)(2)(A) does not apply to any county with a metropolitan form of government and having a population of four hundred thousand (400,000) or more, according to the 1980 federal census or any subsequent federal census.

**(b)** It is unlawful for any officer, committee member, director, or other person whose duty it is to vote for, let out, overlook, or in any manner to superintend any work or any contract in which any municipal corporation, county, state, development district, utility district, human resource agency, or other political subdivision created by statute shall or may be interested, to be indirectly interested in any such contract unless the officer publicly acknowledges such officer's interest. "Indirectly interested" means any contract in which the officer is interested but not directly so, but includes contracts where the officer is directly interested but is the sole supplier of goods or services in a municipality or county.

**Attachment 5**  
**ANDERSON COUNTY GOVERNMENT**  
**PURCHASING DEPARTMENT**

**CONFLICT OF INTEREST AFFIDAVIT/STATEMENT**

**(c) (1)** Any member of a local governing body of a county or a municipality who is also an employee of such county or municipality and whose employment predates the member's initial election or appointment to the governing body of the county or municipality may vote on matters in which the member has a conflict of interest if the member informs the governing body immediately prior to the vote as follows: "Because I am an employee of (name of governmental unit), I have a conflict of interest in the proposal about to be voted. However, I declare that my argument and my vote answer only to my conscience and to my obligation to my constituents and the citizens this body represents." The vote of any such member having a conflict of interest who does not so inform the governing body of such conflict shall be void if challenged in a timely manner. As used in this subdivision (c)(1), "timely manner" means during the same meeting at which the vote was cast and prior to the transaction of any further business by the body.

**(2)** Any member of a local governing body of a county or a municipality who is also an employee of such county or municipality and whose employment began on or after the date on which the member was initially elected or appointed to serve on the governing body of the county or municipality shall not vote on matters in which the member has a conflict of interest.

**(3) (A)** In the event a member of a local governing body of a county or a municipality has a conflict of interest in a matter to be voted upon by the body, such member may abstain for cause by announcing such to the presiding officer.

**(B) (i)** Any member of a local governing body of a municipality who abstains from voting for cause on any issue coming to a vote before the body shall not be counted for the purpose of determining a majority vote.

**(ii)** This subdivision (c)(3)(B) shall in no way be construed to apply to any county having a metropolitan form of government and having a population in excess of five hundred thousand (500,000), according to the 1990 federal census or any subsequent federal census.

**(d)** This section shall apply to a member of the board of directors or officer of any nonprofit corporation required under § 8-44-102(b)(1)(E) to conduct all meetings of its governing body as open meetings.

I have read and understand **both** T.C. A. 5-14-114 and T. C. A. 12-4-101, and will comply.

**NOTE: PLEASE SIGN AND RETURN PAGE TWO IN YOUR BID PACKET.**

\_\_\_\_\_  
Contractor or Company Owner (signature)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Contractor or Company Name (print)

**BACKGROUND CHECK COMPLIANCE FORM****ANDERSON COUNTY GOVERNMENT**

PURCHASING DEPARTMENT  
 100 N. MAIN STREET, ROOM 214 or 218  
 CLINTON, TN 37716  
 (865) 457-6251  
 (865) 457-6252 (Fax)

**BID NUMBER** \_\_\_\_\_**CONTRACT NUMBER** \_\_\_\_\_

**BACKGROUND CHECKS** Contractors shall comply with Public Chapter 587 of 2007, as codified in Tennessee Code Annotated Section 49-5-413, which requires all contractors to facilitate a criminal history records check conducted by the Tennessee Bureau of Investigation and the Federal Bureau of Investigation for each employee prior to permitting the employee to have contact with students or enter school grounds when students are present.

Any person, corporation or other entity who enters or any employee of any person, corporation or entity who enters into or renews a contract with a local board of education or child care program on or after September 1, 2007, must:

- (1) Provide a fingerprint sample
- (2) Submit to a criminal history records check to be conducted by the Tennessee Bureau of Investigations and the Federal Bureau of Investigations.

Contact the Anderson County School's Human Resources Department at (865) 463-2800 ext. 2811 for fingerprint instructions.

Company or Individuals (Name) \_\_\_\_\_

Address \_\_\_\_\_

City, State, Zip Code \_\_\_\_\_

Telephone Number \_\_\_\_\_

(       )

Contractor License Number (If Applicable) \_\_\_\_\_

I agree to abide by Public Chapter 587 of 2007, as codified in Tennessee Code Annotated Section 49-5-413, and certify that I am authorized to sign. The undersigned further agrees if this bid or contract is accepted, to furnish any and all of the Background Check Information on himself and all of his employees as required by law, at the request of Anderson County Government. I hereby agree to release all criminal history and other required information to Anderson County Government, the Tennessee Bureau of Investigation and the Federal Bureau of Investigation in accordance with Tennessee law and I further certify that all information supplied by me regarding this inquiry is true and accurate. I agree to release and hold harmless the above-mentioned governmental entities for the use of this information related to the purposes mandated under Tennessee law. I further certify that I have obtained acceptable criminal history information on all current employees and will obtain said information on future employees associated with the performance of the work defined in this bid or contract, pursuant to Tennessee Code Annotated 49-5-413 and that neither I nor any employee of mine is prohibited from direct contact with school children for the reasons enumerated in Tennessee Code annotated Section §§ 49-5-401 et seq.

Signature \_\_\_\_\_ Title \_\_\_\_\_

Printed Name: \_\_\_\_\_ Date \_\_\_\_\_

(Please Print Clearly)

(Month, Day, Year)

**INTERNAL OFFICE USE ONLY**

Notes \_\_\_\_\_



Attachment 7

DRUG-FREE WORKPLACE AFFIDAVIT

STATE OF \_\_\_\_\_

COUNTY OF \_\_\_\_\_

The undersigned, principal officer of \_\_\_\_\_, an employer of five (5) or more employees contracting with \_\_\_\_\_ County Government to provide construction services, hereby states under oath as follows:

1. The undersigned is a principal officer of \_\_\_\_\_ (hereinafter referred to as the "Company"), and is duly authorized to execute this Affidavit on behalf of the Company.
2. The Company submits this Affidavit pursuant to T.C.A. 50-9-113, which requires each employer with no less than five (5) employees receiving pay who contracts with the state or any local government to provide construction services to submit an affidavit stating that such employer has a drug-free workplace program that complies with Title 50, Chapter 9 of the *Tennessee Code Annotated*.
3. The Company is compliance with T.C.A. 50-9-113

Further affiant saith not.

\_\_\_\_\_  
Principal Officer

STATE OF \_\_\_\_\_

COUNTY OF \_\_\_\_\_

Before me personally appeared \_\_\_\_\_, with whom I am personally acquainted (or proved to me on the basis of satisfactory evidence), and who acknowledged that such person executed the foregoing affidavit for the purpose therein contained.

Witness my hand and seal office this \_\_\_\_\_ day of \_\_\_\_\_,  
20\_\_\_\_.

\_\_\_\_\_  
Notary Public

My commission expires: \_\_\_\_\_, 20\_\_\_\_\_.



## General Terms and Conditions

### **BID ENVELOPE SUBMISSION INSTRUCTIONS:**

Bids are to be received in a sealed envelope/package with the bid number, company name and opening date clearly marked. Failure to comply may result in rejection of the entire bid. Anderson County will not be responsible for any lost or misdirected mail. Late bids, e-mailed bids and faxed bids will not be considered nor returned. It is the sole responsibility of the bidder to ensure their bid is delivered to the Purchasing Department.

Please note that Anderson County Government does not receive a guaranteed delivery time for express mail and/or packages. PLEASE MAIL ACCORDINGLY.

**ANDERSON COUNTY FINANCE DEPARTMENT  
100 NORTH MAIN STREET, SUITES 214 AND 218  
CLINTON, TN 37716**

**Email: [purchasing@andersoncountyttn.gov](mailto:purchasing@andersoncountyttn.gov)**

**Website: <http://andersontn.org/purchasing>**

(865) 457-6218 Phone

(865) 457-6252 Fax

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**Bid documents must be completed in ink or typed, signed in ink,  
and free from alterations, erasures or mark-throughs.**

### **SECTION 1 - GENERAL TERMS AND CONDITIONS**

**1.1 ALTERATIONS OR AMENDMENTS:** Alterations, amendments, changes, modifications or additions to this solicitation shall not be binding on Anderson County without prior written approval.

**1.2 NO CONTACT POLICY:** After vendor receives a copy of this bid, any contact initiated by any vendor with any Anderson County representative, other than the Purchasing Department, concerning this invitation for bid is prohibited and agreements made thereto will not be considered binding on Anderson County. Any such unauthorized contact may cause the disqualification of the bidder from this procurement transaction.

**1.3 QUESTIONS:** Pursuant to TCA §12-4-113, questions regarding the specifications or bid procedures must be received by the Purchasing Agent and/or designer no less than ninety-six (96) hours before the bid opening date. No addenda within less than forty-eight (48) hours of the bid opening date shall be permitted. Any questions concerning the bid document must be submitted to [purchasing@andersontn.org](mailto:purchasing@andersontn.org) no less than ninety-six (96) hours before bid opening date.

**1.4 BID CLOCK:** The bid/time clock in the Anderson County Purchasing office will be the time of record.

**1.5 TAXES:** Anderson County is not liable for Federal excise or State sales tax. Tax exemption certificates will be provided upon request.

**1.6 CONFLICT OF INTEREST:** If requested by the Purchasing Agent, vendors must complete and submit a "Conflict of Interest Affidavit Statement" prior to contract award, see T.C.A. 5-14-114 and T. C. A. 12-4-101.

**1.7 NON-COLLUSION:** Vendors, by submitting a signed bid, certify that the accompanying bid is not the result of, or affected by, any unlawful act of collusion with any other person or company engaged in the same line of business or commerce, or any other fraudulent act punishable under Tennessee or United States law.

**1.8 NON-DISCRIMINATION:** Contracted vendors will not discriminate against any employee or applicant for employment because of race, religion, sex, national origin or disability except where religion, sex, national origin or disability is a bona fide occupational qualification reasonably necessary to the normal operation of the contractor.

**1.9 SAME AS OR EQUIVALENT TO:** Vendors are to bid as specified herein or propose an approved equal. Determination of equality is solely Anderson County's responsibility. Any designated brands are for reference purpose only, not a statement of preference. When an alternate manufacturer, brand, model or make is bid, Anderson County will determine if the item bid meets or exceeds the items as specified. If the bidder does not indicate that an alternate manufacturer, brand, model or make is being bid, it is understood that the item(s) bid are the same manufacturer, brand, model or make as requested in the Invitation to Bid. Comparable products of other manufacturers will be considered if proof of comparability is contained in the bid submission. It shall be the responsibility of the vendors, including vendors whose product is referenced to furnish upon request catalog pages, brochures or other data to provide an adequate basis for determining the quality and functional capabilities of the product offered. Failure to provide this data may be considered valid justification for rejection of bid.

**1.10 MULTIPLE BIDS/AWARDS:** Anderson County may consider multiple bid awards.

**1.11 STATE OF TENNESSEE CONTRACTORS' LICENSE LAW (T.C.A. 62-6-119) b):** Bids for which the total cost of the project is twenty-five thousand dollars (\$25,000) or more, the outside of the sealed bid envelope/package containing the bid provides the following information: the Company Name, the Contractor's license number, license classification, the date of the license expiration and that part of each license classification applying to the bid. In addition, each heating ventilation or air conditioning, plumbing and electrical subcontractor's license number, date of the license expiration and that part of each classification applying to the bid if the value of the work is \$25,000 or greater, must be notated. If the value of either the contractor or the subcontractor's work is less than \$25,000, the bid envelope/package containing the bid is to be notated with the phrase "Contractor or Subcontractor's Bid is Less than \$25,000" after each appropriate heading. In the case of joint ventures, each party submitting the bid must provide this information. If no subcontractors are being used, the outside of the envelope/package containing the bid must state, "No Subcontractors are being used on this project."

**1.12 ACCEPTANCE:** Vendors shall hold their price firm and subject to acceptance by Anderson County for a minimum period of sixty (60) working days from the date of the bid opening, unless otherwise indicated in their bid. Any or all bids may be rejected for good cause.

**1.13 BID AWARDS:** Bids will be awarded to the lowest and best bidder, taking into consideration the qualities of the articles to be supplied, their conformity with specifications and their suitability to the requirements of Anderson County and the delivery terms. Anderson County also reserves the right to not award this bid.

**1.14 BIDDER'S MINIMUM QUALIFICATIONS:** Bidders must have the resources and capability to provide the materials and services as described in the solicitation. Anderson County reserves the right to request additional information and/or material not specified as a bid requirement from any bidder to confirm qualifications.

**1.15 DEBARMENT:** By submitting a response to this solicitation, bidders are certifying that bidder is not currently debarred from doing business with any local or state Government or the Federal Government. Bidders shall provide documentation relating to any and all debarments that occurred within the last ten

years. The County will search the "System for Award Management" for federally excluded vendors before awarding a bid.

**1.16 PROTEST:** Any vendor wishing to protest the bid award shall notify in writing the Anderson County Purchasing Agent and the County Law Director, 101 S. Main Street, Suite 310, Clinton, TN 37716. No protest will be accepted, except those protests made in writing and received within (10) ten calendar days of the bid award. Protests must be in writing and envelopes/package containing protest must be clearly marked with bid number and words "BID PROTEST". The Purchasing Agent, in conjunction with the Purchasing Committee, and with the advice and counsel of the County Law Director, shall review and make a final decision as to any bid protest. Appeals shall be filed in the Circuit or Chancery Courts of Anderson County within sixty (60) days of the final decision.

**VENDORS PLEASE NOTE: ANDERSON COUNTY WILL NOT STOP THE PURCHASE PROCESS. THE PURCHASE MAY BE COMPLETED OR THE PROJECT MAY BE RE-BID WHILE THE PROTEST PROCEDURE IS STILL IN OPERATION. IF A RE-BID IS MADE, THE PROTESTING VENDOR SHOULD SUBMIT A NEW BID. OTHERWISE, THEY WILL BE WITHOUT A BID ON THE RE-BID. FURTHER, THE RE-BIDDING WILL NOT END THE APPEALS PROCESS. IT WILL CONTINUE UNTIL A FINAL DECISION IS REACHED OR THE COMPLAINANT WITHDRAWS THE APPEAL.**

**1.17 DELIVERY:** Bid pricing is to include complete supply and delivery to Anderson County, Tennessee. Vendors are to state the delivery time in the bid. Anderson County requires that vendors deliver all products "free on board" to final destination unless indicated otherwise in the bid requirements.

**1.18 PROOF OF FINANCIAL AND BUSINESS CAPABILITY:** Bidders must, upon the request of Anderson County, provide satisfactory evidence of their ability to furnish products or services in accordance with the terms and conditions of these specifications. Anderson County will make the final determination as to the bidder's ability.

**1.19 VENDOR'S DEFAULT:** Anderson County reserves the right, in case of vendor default, to procure the articles or services from other sources and hold the defaulting vendor responsible for any excess costs occasioned thereby.

**1.20 DUPLICATE COPIES:** Vendors are to submit one original and at least one exact copy of their bids, including brochures; unless additional copies are requested in bid specifications.

**1.21 DRUG-FREE WORKPLACE:** Under the provisions of Tennessee Code Annotated §50-9-113 enacted by the General Assembly effective 2001, all employers with five (5) or more employees who contract with either the state or a local government to provide construction services are required to submit an affidavit stating that they have a drug free workplace program that complies with Title 50, Chapter 9, in effect at the time of submission of a bid at least to the extent required of governmental entities. The statute imposes other requirements on the contractor and contractors should consult private legal counsel if legal questions arise under this section or any other provision of this document. All contractors with five (5) or more employees that will be providing construction services are to return the provided written affidavit signed by the principal officer of a covered employer acknowledging that the contracting entity is in compliance with the Drug Free Workplace laws of State of Tennessee.

**1.22 COMPETITION INTENDED:** It is the responsibility of the bidder to review the entire Invitation to Bid document and to notify the Purchasing Department if the Invitation to Bid is formulated in a manner that would unnecessarily restrict competition or if it is ambiguous in what is being requested. The Purchasing Agent must receive questions regarding the specifications or bid procedures no less than ninety-six (96) hours prior to the time set for the bid opening.

**1.23 SCHOOL CAFETERIA BIDS:** If this bid is for Anderson County School's Cafeteria Food Service Department, bidders must be in compliance with Section 104(d) of the William F. Goodling Child Nutrition Reauthorization Act of 1998 which requires school and institutions participating in the National School Lunch Program (NSLP) and School Breakfast Program (SBP) to "Buy American" to the maximum extent practicable.

**1.24 TERMINATION:** Anderson County reserves the right to terminate contracts in whole or in part with thirty (30) days written notification to the contractor. In the event of termination, the County shall not be liable for any costs other than the cost of services performed and materials delivered and accepted prior to termination date.

**1.25 OSHA SAFETY:** The Vendor is responsible for training their employees in Safety and Health Regulations for the job, assuring compliance with Tennessee Occupational Safety and Health regulations and any other Regulatory Agency.

**1.26 PERFORMANCE BOND:** A standard surety or performance bond or an irrevocable letter of credit in favor of Anderson County Government at a federally insured financial institution will be required to be submitted with bid, if indicated in section four, item six insurance requirement checklist.

**1.27 BACKGROUND CHECKS:** Contractors shall comply with Public Chapter 587 of 2007, as codified in Tennessee Code Annotated Section 49-5-413, which requires all contractors to facilitate a criminal history records check conducted by the Tennessee Bureau of Investigation and the Federal Bureau of Investigation for each employee prior to permitting the employee to have contact with students or enter school grounds when students are present.

**1.28 AWARD RESULTS:** As soon as practicable after proposal or bid evaluations, Anderson County shall post the award decision to Vendor Registry at [www.vendorregistry.com](http://www.vendorregistry.com). Individual notices are normally not mailed or e-mailed except to the successful vendor.

**1.29 INDEMNIFICATION/HOLD HARMLESS:** Vendor shall indemnify, defend, save and hold harmless Anderson County and, its officers, agents and employees from all suits, claims, actions or damages of any nature brought because of, arising out of, or due to breach of the agreement by Vendor, its subcontractors, suppliers, agents, or employees or due to any negligent act or occurrence or any omission or commission of Vendor, its subcontractors, suppliers, agents or employees.

**1.30 DECLARATIVE STATEMENT:** Any statement or words (i.e.: must, shall, will, etc.) are declarative statements and the proposer must comply with the condition. Failure to comply with any such condition may result in their bid being non-responsive and disqualified.

**1.31 WAIVING OF INFORMALITIES:** Anderson County reserves the right to waive minor informalities or technicalities when it is in the best interest of Anderson County.

**1.32 APPROPRIATION:** Funding for multi-year contracts are subject to budget appropriations. In the event no funds are appropriated by Anderson County for the goods or services in any fiscal year or insufficient funds exist to purchase the goods or services of a contract, then that contract shall expire upon the expenditure of previously appropriated funds or the end of the current fiscal year, whichever occurs first, with no further obligations owed to or by either party.

**1.33 ASSIGNMENT:** Vendor shall not assign or sub-contract any agreement, its obligations or rights hereunder to any party, company, partnership, incorporation or person without the prior written specific consent of Anderson County.

**1.34 QUANTITIES:** Anderson County does not guarantee quantities to be purchased off this bid.

**1.35 UNIT PRICE:** In case of discrepancy between any unit price and an extended price, the unit price will be presumed to be correct, subject, however, to correction to the same extent and in the same manner as any other mistake.

**1.36 MODIFICATION OR WITHDRAWAL OF BIDS:** When it is certain that a mistake has been made in the preparation of the bid, a request will be made to the bidder to confirm the bid. Provisions must be made so that mistakes can be taken care of and the ambiguity resolved satisfactorily. Bids may be modified or withdrawn by written notice received in the Purchasing Department prior to the time and date set for the bid

opening. The changes or withdrawal of the bids shall be in writing and signed by an official of the company. The envelope containing the modification should clearly state "modification to bid." Either the entire bid or a particular item may be withdrawn or modified in this manner.

**1.37 PRE-BID CONFERENCES:** Attendance at Pre-bid Conferences is strongly encouraged. When deemed necessary a Mandatory Pre-bid Conference will be held. A company representative **MUST** be in attendance and sign the Pre-bid sign-in sheet in order to be considered for bid award.

**1.38 ADDENDUM:** § T.C.A. 12-14-113 Anderson County Government reserves the right to amend this solicitation by addendum. Addenda will be posted to the vendor registry up to 48 hours in advance of the bid/proposals due date and time. It is the bidder's responsibility to check the website for addendum. If in the County's opinion revisions are of such a magnitude, the deadline for this solicitation may be extended in an addendum. Addenda may change specifications, reply sheets, and times and dates for pre-bid meetings as well as due dates/deadlines for questions and bids/proposals.

**1.39 OWNERSHIP:** All bids, once received, become property of Anderson County Government and will not be returned.

**1.40 WEATHER AND COURTHOUSE CLOSINGS:** In the event of a situation severe enough to necessitate the closing of Anderson County Government offices during a planned bid opening, vendors will receive notification of the new date and time upon re-opening of county government offices. No bids will be opened until the rescheduled date for bid opening and all bidders/proposers whose submissions meet the extended deadline will be given equal consideration at that time. Anderson County shall not be liable for any commercial carrier's decision regarding deliveries during inclement weather.

**1.41 IRAN DIVESTMENT ACT OF 2014:** Pursuant to the Iran Divestment Act of 2014, Tenn. Code Ann. § 12-12-106 requires the State of Tennessee Chief Procurement Officer to publish, using creditable information freely available to the public, a list of persons it determines engage in investment activities in Iran, as described in § 12-12-105. Inclusion on this list makes a person ineligible to contract with Anderson County; if a person ceases its engagement in investment activities in Iran, it may be removed from the list. The State of Tennessee list is available here: [http://tennessee.gov/generalservices/article/ Public-Information-library](http://tennessee.gov/generalservices/article/Public-Information-library).

**1.42 ANTI-BOYCOTT OF ISRAEL:** By responding to this bid the Bidder certifies that it is not currently engaged in and agrees for the duration of this Agreement not to engage in, the boycott of Israel.





Advancement  
of Construction  
Technology

## SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS LIST

Project: \_\_\_\_\_

From (Contractor): \_\_\_\_\_

Date: \_\_\_\_\_

To (A/E): \_\_\_\_\_

A/E Project Number: \_\_\_\_\_

Contract For: \_\_\_\_\_

List Subcontractors and Major Material Suppliers proposed for use on this Project as required by the Construction Documents. Attach supplemental sheets if necessary.

Section Number	Section Title	Firm	Address	Phone Number (Fax Number)	Contact
-------------------	------------------	------	---------	------------------------------	---------

☐ Attachments

Signed by: \_\_\_\_\_ Date: \_\_\_\_\_

Copies: ☐ Owner ☐ Consultants ☐ \_\_\_\_\_ ☐ \_\_\_\_\_ ☐ \_\_\_\_\_ ☐ \_\_\_\_\_ ☐ \_\_\_\_\_ ☐ \_\_\_\_\_ ☐ File



Non-Tennessee resident companies wishing to do business with Anderson County must have proof of a current Certificate of Authority from the Tennessee Secretary of State office before entering into any acquisition agreement or contract with the County per Tennessee Code Annotated 48-11-309. Application forms for this certificate can be downloaded from the Secretary of State web site at [www.state.tn.us/sos](http://www.state.tn.us/sos) or by phoning 615-741-2286.



TO:

Anderson County School Board  
Contact: Dr. Tim Parrott, Ed.D.  
101 S. Main Street  
Clinton, TN 37716

PROJECT:

A New School For: Claxton Elementary School  
105 Fellowship Lane  
Powell, TN 37849

Having carefully and thoroughly examined the Project Manual, including all Specifications, and all Drawings for the above referenced project, the Undersigned proposes to perform all Work contained therein in strict compliance with ALL included requirements.

The undersigned certifies that the following statements are correct and acknowledges each by initialing the space adjacent to each:

- \_\_\_\_\_ I understand that manufacturers and products provided on the Drawings and in the Project Manual ARE NOT specified as such to only provide a standard of quality but are, in fact, specified as such to also indicate the exact manufacturer and/or product intended by the Owner, Architect and/or Engineer for use in the construction of the above referenced project.
- \_\_\_\_\_ I will not at any time use or install products that have not been approved in compliance with Division 1 requirements.
- \_\_\_\_\_ I understand that I, nor any of those in my employ, have the authority to determine whether or not a product is "equal" to the specified product or basis of design.
- \_\_\_\_\_ The proposed Base Bid includes all specified manufacturers, products and materials or manufacturers, products and materials which were approved in compliance with Division 1 requirements prior to submission of Bid proposal.
- \_\_\_\_\_ I understand that my bid may be rejected if I did not bid all aspects of the project as specified.

Having certified the above to best of my knowledge, I further certify, by signature below, that failure(s) to comply with the specified products, procedures and/or requirements and the subsequent correction thereof, by course determined by the Architect or Engineer, shall not be grounds for additional compensation of time or monies whether or not such failures were intentional.

Signature & Date

\_\_\_\_\_

Print Name

\_\_\_\_\_

Title

\_\_\_\_\_

Contractor Company Name

\_\_\_\_\_

Contractor's License No.

\_\_\_\_\_

Date of Expiration

\_\_\_\_\_

License Classification

\_\_\_\_\_

Address

\_\_\_\_\_

\_\_\_\_\_



At your request, MBI Companies, Inc. (MBI) will provide electronic files for your convenience and use in the preparation of documents related to A New School For: Claxton Elementary School, subject to the following terms and conditions:

**Electronic File(s) Transfer Fees are based on the following:**

- ☐ **Adobe PDF format:** \$60.00 for the first drawing/file and \$30.00 for each additional drawing/file will be required. This fee is payable in advance and by credit card only.
- ☐ **Autodesk DWF format:** \$60.00 for the first drawing/file and \$30.00 for each additional drawing/file will be required. This fee is payable in advance and by credit card only.
- ☐ **Autodesk AutoCAD DWG format:** \$80.00 per drawing/file. This fee is payable in advance and by credit card only.
- ☐ **Autodesk Revit RVT format (if available):** ☐\$1500.00 Architectural model/file ☐\$1000.00 Structural model/file ☐\$1000.00 Mechanical model/file ☐\$1000 Plumbing model/file ☐\$1000.00 Electrical model/file ☐\$1000.00 Fire protection model ☐ \$4000.00 all model sets. This fee is payable in advance and by credit card only.  
Large requests will be evaluated for the effort required to bundle and transfer the information and will be assessed on a case by case basis.

MBI makes no representation as to the compatibility of these files with your hardware or your software beyond the specified release of the referenced software.

Data contained on these electronic files is part of MBI's instruments of service and shall not be used by you or anyone else receiving this data through or from you for any purpose other than as a convenience in the preparation of documents pertaining to the referenced project. Any use by you or others, will be your sole risk and without liability or legal exposure to MBI. You agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against MBI, its officers, directors, employees, agents or sub-consultants which may arise out of or in connection with your use of the electronic files.

Furthermore, you shall, to the fullest extent permitted by law, indemnify and hold harmless MBI from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from your use of these electronic files.

These electronic files are not Contract Documents. Significant differences may exist between these electronic files and corresponding hard copy Contract Documents due to addenda, change orders or other revisions. MBI makes no representation regarding the accuracy or completeness of the electronic files you receive. In the event that a conflict arises between the signed Contract Documents prepared by MBI and Electronic Files, signed Contract Documents shall govern. You are responsible for determining if any conflict exists. By your use of these electronic files, you are not relieved of your duty to fully comply with the Contract Documents, including and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate your work with that of other Contractors for the project.

The fees listed above are for costs to un-archive, gather and transmit files only, and under no circumstances shall delivery of the electronic files for use by you be deemed a sale of the file(s) by MBI and MBI makes no warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall MBI be liable for any loss of profit or any consequential damages. Usage by any parties of the data contained in the electronic files released shall constitute agreement to these terms.

Any requests for updated electronic files shall incur additional charges.

Please return this completed form by email: mbi@mbicompanies.com. Once the fees have been paid, the file(s) will be transferred to the indicated e-mail address and a receipt will be returned by mail.

Transfer Fee Amount: \_\_\_\_\_

Email Address: \_\_\_\_\_ Phone Number: \_\_\_\_\_

Method of Payment: \_\_\_\_\_ VISA \_\_\_\_\_ MasterCard \_\_\_\_\_ AMEX

Visa Code (Last 3 digits on back of card) \_\_\_\_\_ AMEX (4 digits on front of card) \_\_\_\_\_

Credit Card Number and Expiration Date: \_\_\_\_\_

Name & Address of Cardholder: \_\_\_\_\_

Cardholder Signature & Date \_\_\_\_\_



## **Schedule of Inspection and Testing Agencies**

---

This Statement of Special Inspections / Quality Assurance Plan includes the following building systems:

- |  |  |
|--|--|
| <input type="checkbox"/> Soils and Foundations     | <input type="checkbox"/> Spray Fire Resistant Material         |
| <input type="checkbox"/> Cast-in-Place Concrete    | <input type="checkbox"/> Wood Construction                     |
| <input type="checkbox"/> Precast Concrete          | <input type="checkbox"/> Exterior Insulation and Finish System |
| <input type="checkbox"/> Masonry                   | <input type="checkbox"/> Mechanical & Electrical Systems       |
| <input type="checkbox"/> Structural Steel          | <input type="checkbox"/> Architectural Systems                 |
| <input type="checkbox"/> Cold-Formed Steel Framing | <input type="checkbox"/> Special Cases                         |



## Qualifications of Inspectors and Testing Technicians

---

The qualifications of all personnel performing Special Inspection and testing activities are subject to the approval of the Building Official. The credentials of all Inspectors and testing technicians shall be provided if requested.

### Key for Minimum Qualifications of Inspection Agents:

When the Registered Design Professional in Responsible Charge deems it appropriate that the individual performing a stipulated test or inspection have a specific certification or license as indicated below, such designation shall appear below the *Agency Number* on the Schedule.

PE/SE	Structural Engineer – a licensed SE or PE specializing in the design of building structures
PE/GE	Geotechnical Engineer – a licensed PE specializing in soil mechanics and foundations
EIT	Engineer-In-Training – a graduate engineer who has passed the Fundamentals of Engineering examination

### American Concrete Institute (ACI) Certification

ACI-CFTT	Concrete Field Testing Technician – Grade 1
ACI-CCI	Concrete Construction Inspector
ACI-LTT	Laboratory Testing Technician – Grade 1&2
ACI-STT	Strength Testing Technician

### American Welding Society (AWS) Certification

AWS-CWI	Certified Welding Inspector
AWS/AISC-SSI	Certified Structural Steel Inspector

### American Society of Non-Destructive Testing (ASNT) Certification

ASNT	Non-Destructive Testing Technician – Level II or III.
------	---

### International Code Council (ICC) Certification

ICC-SMSI	Structural Masonry Special Inspector
ICC-SWSI	Structural Steel and Welding Special Inspector
ICC-SFSI	Spray-Applied Fireproofing Special Inspector
ICC-PCSI	Prestressed Concrete Special Inspector
ICC-RCSI	Reinforced Concrete Special Inspector

### National Institute for Certification in Engineering Technologies (NICET)

NICET-CT	Concrete Technician – Levels I, II, III & IV
NICET-ST	Soils Technician - Levels I, II, III & IV
NICET-GET	Geotechnical Engineering Technician - Levels I, II, III & IV

### Exterior Design Institute (EDI) Certification

EDI-EIFS	EIFS Third Party Inspector
----------	----------------------------

### Other

---

**STRUCTURAL OBSERVATION AGREEMENT**

Structural observations shall be provided in Seismic Design Category D, E or F when one of the following conditions exists:

- ( ) 1. The structure is classified as Occupancy Category III, or IV.
- ( ) 2. The height of the structure is greater than 75 feet above the base.
- ( ) 3. The structure is assigned to Seismic Design Category E, is classified as Occupancy Category I or II and is greater than two stories in height.
- ( ) 4. When so designated by the Architect or Engineer of record.
- ( ) 5. When such observation is specifically required by the Building Official.

---

ENGINEER OR ARCHITECT RESPONSIBLE FOR THE  
STRUCTURAL DESIGN (PRINT OR TYPE)

---

SAME SIGNATURE

---

DATE

---

DESIGNATED ENGINEER OR ARCHITECT TO PERFORM  
STRUCTURAL OBSERVATION (PRINT OR TYPE)

---

SAME SIGNATURE

---

DATE

## Contractor's Request for Information (RFI)

Project Name:	Contract No.:	Date:	RFI No.:
Contractor's Name:	To:		
Subject:			

### References

Area(s):
Specification Section(s):
Drawing No.:
Other References:
Problem / Information Requested:          

Information Requested by:

Reply needed by:

Contractor's Interpretation and Proposed Resolution:       
--

### Architect's / Engineer's Evaluation and Response

Disposition:	Clarification Only	Sketch or Drawing	Other
Approval:	Project Manager	Owner	Contractor



<b>To:</b>
<b>Attn:</b>
<b>Specified Item:</b>

<b>Project:</b>
<b>Proposed Substitute:</b>

1. Reason for proposing this substitution:

2. The following are attached (Mark all that apply):

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

**Complete Description**

**Laboratory Tests**

Information on the availability of  
maintenance services and replacement  
materials for proposed substitute(s)

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

**Catalog**

**Spec Data**

Names, addresses, and phone numbers  
of fabricators and suppliers for proposed  
substitute(s)

3. This substitution will have the following effects on dimensions, gauges, weights, etc.:

4. This substitution will have the following effects on wiring, piping, ductwork, etc.:

5. This substitution will have the following effects on other trades:

6. This substitution will have the following effect on construction Schedules:

7. The proposed substitute(s) differs from the specified product(s) in quality and performance as follows:

8. Manufacturers guarantees for the substitute(s) and the specified product(s) are (check one):

☐

**the same**

☐

**different** (if different, explain below)

9. If the proposed substitution is accepted, it will result in:  
☐ **no cost impact** ☐ **a cost increase of** \_\_\_\_\_  
☐ **a cost decrease of** \_\_\_\_\_  
(If change in cost is indicated, itemization on specified Cost Itemization Form is attached)

10. License fees or royalties are pending on the proposed substitute.  
☐ **No** ☐ **Yes** (if yes, explain below)

11. The undersigned or the firm represented shall pay for additional studies, investigations, submittals, redesign, and analysis by the Designer necessitated by this substitution request.

Substitutions must be requested in accordance with applicable Contract requirements. After bidding, substitutions are to be submitted only by Contractor. Substitute products should not be ordered or installed without written acceptance.

**Submitted by:**

**Date:**

Sign here:

**Name:**

**Telephone:**

type or print:

**for:**

Name of firm:

**Address:**

Street address:

and mailing address

if different:

City, State,  
and Zip Code:

**Designer's Review Comments:**

☐  
☐

**Accepted**

**Accepted as noted**

☐  
☐  
☐

**Rejected**

**Rejected (received too late)**

**Rejected (submittal incomplete)**

**Additional comments:**

**For the Designer:**

**Date:**

Signature here:



# AIA® Document A201® – 2017

## General Conditions of the Contract for Construction

### for the following PROJECT:

(Name and location or address)

A New School For: Claxton Elementary School  
105 Fellowship Lane  
Powell, TN 37849  
Anderson County Bid #2521  
MBI Comm. No.: 230042.02

### THE OWNER:

(Name, legal status and address)

Anderson County School Board  
Contact: Dr. Tim Parrott, Ed.D.  
101 S. Main Street  
Clinton, TN 37716

### THE ARCHITECT:

(Name, legal status and address)

MBI Companies Inc.  
299 N. Weisgarber Road  
Knoxville, TN 37919

### TABLE OF ARTICLES

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5	SUBCONTRACTORS
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8	TIME
9	PAYMENTS AND COMPLETION
10	PROTECTION OF PERSONS AND PROPERTY
11	INSURANCE AND BONDS
12	UNCOVERING AND CORRECTION OF WORK
13	MISCELLANEOUS PROVISIONS

### 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.

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

14      TERMINATION OR SUSPENSION OF THE CONTRACT

15      CLAIMS AND DISPUTES



Init.

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**User Notes:**

(1866952314)

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## **ARTICLE 1 GENERAL PROVISIONS**

### **§ 1.1 Basic Definitions**

#### **§ 1.1.1 The Contract Documents**

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

#### **§ 1.1.2 The Contract**

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

#### **§ 1.1.3 The Work**

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

#### **§ 1.1.4 The Project**

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

#### **§ 1.1.5 The Drawings**

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

#### **§ 1.1.6 The Specifications**

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

#### **§ 1.1.7 Instruments of Service**

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

#### **§ 1.1.8 Initial Decision Maker**

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

### **§ 1.2 Correlation and Intent of the Contract Documents**

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

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

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

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

### § 1.3 Capitalization

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

### § 1.4 Interpretation

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

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

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

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

### § 1.6 Notice

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

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

### § 1.7 Digital Data Use and Transmission

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

### § 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document

G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

## **ARTICLE 2 OWNER**

### **§ 2.1 General**

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

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

### **§ 2.2 Evidence of the Owner's Financial Arrangements**

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

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

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

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

### **§ 2.3 Information and Services Required of the Owner**

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

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

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

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

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

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

#### **§ 2.4 Owner's Right to Stop the Work**

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

#### **§ 2.5 Owner's Right to Carry Out the Work**

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

### **ARTICLE 3 CONTRACTOR**

#### **§ 3.1 General**

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

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

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

#### **§ 3.2 Review of Contract Documents and Field Conditions by Contractor**

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

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

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

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

### **§ 3.3 Supervision and Construction Procedures**

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

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

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

### **§ 3.4 Labor and Materials**

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

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

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

### **§ 3.5 Warranty**

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

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

### **§ 3.6 Taxes**

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

### **§ 3.7 Permits, Fees, Notices and Compliance with Laws**

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

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

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

### **§ 3.7.4 Concealed or Unknown Conditions**

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

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

### **§ 3.8 Allowances**

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

**§ 3.8.2** Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

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

### **§ 3.9 Superintendent**

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

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

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

### **§ 3.10 Contractor's Construction and Submittal Schedules**

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

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

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

### **§ 3.11 Documents and Samples at the Site**

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

delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

### **§ 3.12 Shop Drawings, Product Data and Samples**

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

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

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

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

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

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

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

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

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

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

**§ 3.12.10.1** If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will

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

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

### **§ 3.13 Use of Site**

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

### **§ 3.14 Cutting and Patching**

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

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

### **§ 3.15 Cleaning Up**

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

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

### **§ 3.16 Access to Work**

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

### **§ 3.17 Royalties, Patents and Copyrights**

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

### **§ 3.18 Indemnification**

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

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

## **ARTICLE 4 ARCHITECT**

### **§ 4.1 General**

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

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

### **§ 4.2 Administration of the Contract**

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

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

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

### **§ 4.2.4 Communications**

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

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

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

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

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

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

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

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

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

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

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

## ARTICLE 5 SUBCONTRACTORS

### § 5.1 Definitions

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

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

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

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

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

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

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

### § 5.3 Subcontractual Relations

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

### § 5.4 Contingent Assignment of Subcontracts

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

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

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

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

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

## **ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**

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

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

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

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

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

### **§ 6.2 Mutual Responsibility**

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

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

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

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

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

### § 6.3 Owner's Right to Clean Up

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

## ARTICLE 7 CHANGES IN THE WORK

### § 7.1 General

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

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

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

### § 7.2 Change Orders

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

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

### § 7.3 Construction Change Directives

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

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

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

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

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

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

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

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

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

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

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

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

#### § 7.4 Minor Changes in the Work

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

### ARTICLE 8 TIME

#### § 8.1 Definitions

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

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

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

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

## **§ 8.2 Progress and Completion**

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

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

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

## **§ 8.3 Delays and Extensions of Time**

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

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

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

## **ARTICLE 9 PAYMENTS AND COMPLETION**

### **§ 9.1 Contract Sum**

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

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

### **§ 9.2 Schedule of Values**

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

### **§ 9.3 Applications for Payment**

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

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

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

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

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

#### **§ 9.4 Certificates for Payment**

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

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

#### **§ 9.5 Decisions to Withhold Certification**

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

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;

- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

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

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

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

## § 9.6 Progress Payments

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

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

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

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

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

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

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

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

## **§ 9.7 Failure of Payment**

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

## **§ 9.8 Substantial Completion**

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

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

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

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

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

## **§ 9.9 Partial Occupancy or Use**

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

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

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

#### § 9.10 Final Completion and Final Payment

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

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

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

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

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

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

### ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

#### § 10.1 Safety Precautions and Programs

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

#### § 10.2 Safety of Persons and Property

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

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

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

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

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

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

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

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

#### § 10.2.8 Injury or Damage to Person or Property

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

#### § 10.3 Hazardous Materials and Substances

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

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will

promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

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

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

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

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

#### **§ 10.4 Emergencies**

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

### **ARTICLE 11 INSURANCE AND BONDS**

#### **§ 11.1 Contractor's Insurance and Bonds**

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

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

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

**§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance.** Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act

or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

## **§ 11.2 Owner's Insurance**

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

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

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

## **§ 11.3 Waivers of Subrogation**

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

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

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

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

#### **§11.5 Adjustment and Settlement of Insured Loss**

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

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

### **ARTICLE 12 UNCOVERING AND CORRECTION OF WORK**

#### **§ 12.1 Uncovering of Work**

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

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

#### **§ 12.2 Correction of Work**

##### **§ 12.2.1 Before Substantial Completion**

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

##### **§ 12.2.2 After Substantial Completion**

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

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

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

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

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

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

### § 12.3 Acceptance of Nonconforming Work

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

## ARTICLE 13 MISCELLANEOUS PROVISIONS

### § 13.1 Governing Law

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

### § 13.2 Successors and Assigns

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

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

### § 13.3 Rights and Remedies

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

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

### § 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and

approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

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

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

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

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

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

### § 13.5 Interest

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

## ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

### § 14.1 Termination by the Contractor

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

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

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

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

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

**§ 14.2 Termination by the Owner for Cause**

**§ 14.2.1** The Owner may terminate the Contract if the Contractor

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

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

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

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

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

**§ 14.3 Suspension by the Owner for Convenience**

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

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

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

**§ 14.4 Termination by the Owner for Convenience**

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

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

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

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

## **ARTICLE 15 CLAIMS AND DISPUTES**

### **§ 15.1 Claims**

#### **§ 15.1.1 Definition**

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

#### **§ 15.1.2 Time Limits on Claims**

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

#### **§ 15.1.3 Notice of Claims**

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

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

#### **§ 15.1.4 Continuing Contract Performance**

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

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

#### **§ 15.1.5 Claims for Additional Cost**

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

#### **§ 15.1.6 Claims for Additional Time**

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

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

### § 15.1.7 Waiver of Claims for Consequential Damages

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

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

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

### § 15.2 Initial Decision

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

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

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

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

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

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

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

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

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

### § 15.3 Mediation

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

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

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

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

### § 15.4 Arbitration

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

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

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

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

#### **§ 15.4.4 Consolidation or Joinder**

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

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

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

PART 1 GENERAL

- 1.01 The following amendments modify, change, delete from or add to the General Conditions of the Contract for Construction (AIA Document A201, 2017 Edition), hereinafter referred to as the General Conditions. Where any part of the General Conditions is modified or voided by these amendments the unaltered provisions of that part shall remain in effect.

1.02 INTENT OF CONTRACT DOCUMENTS

- A. Add the following Subparagraphs 1.2.4 and 1.2.5 at the end of Paragraph 1.2, Correlation and Intent of the Contract Documents:

**1.2.4 If there is any conflict or discrepancy within or between any of the Contract Documents involving the quality or quantity of work required, it is the intention of the Contract that the work of highest quality or greatest quantity shown or specified shall be furnished,** unless such conflict or discrepancy shall have been brought to the Architect's attention and clarified by Addendum prior to the opening of bids.

**1.2.5 Whether or not the word "ALL" is used in the specifications, coverage is intended to be complete, except where partial coverage is specifically and expressly noted. In all cases where an item is referred to in the singular number, it is intended that the reference shall apply to as many such items as are required to complete the work. Words such as "Install", "Provide", "Furnish", and "Supply" shall be construed as meaning complete furnishing, installing, and constructing unless modified by additional information.**

1.03 DOCUMENTS FURNISHED TO THE CONTRACTOR

- A. Revise Subparagraph 1.5.2 to read as follows:

Copies of the Drawings and Specifications can be obtained by the General Contractor at the cost of reproduction from the print house of their choice subject to the provisions of Paragraph 1.5, Ownership and use of Drawings, Specifications, and other Instruments of Service. All Drawings and Specifications acquired by the Contractor shall be subject to the provisions of Paragraph 1.5, Ownership and use of Drawings, Specifications, and other Instruments of Service.

- B. Add Subparagraph 2.3.7 at the end of Paragraph 2.3, Information and Services Required of the Owner:

**2.3.7 Electronic data files produced by the Architect containing information about the project are instruments of service and shall be subject to the provisions of Paragraph 1.5, Ownership and Use of Drawings, Specifications, and Other Instruments of Service. Electronic data files are not Contract Documents and differences may exist between these electronic files and the hard copy documents issued as Contract Documents. These files may be made available to the Contractor for convenience in preparing documents relating to the project upon execution of an electronic files release and payment of transfer fees as stated in the electronic files release.**

1.04 REVIEW OF CONTRACT DOCUMENTS

- A. Add the following Subparagraph 3.2.5 at the end of Paragraph 3.2, Review of Contract Documents and Field Conditions by Contractor:

**3.2.5 Should discrepancies or conflicts in the requirements of the Drawings and Specifications be discovered after the work has started, the Contractor shall report such discrepancies or conflicts to the Architect immediately and no work affected thereby shall be started, or if started, shall be stopped immediately until the Contractor and the Architect agree upon clarification of the discrepancy or conflict.**

1.05 PERMITS, FEES AND NOTICES

- A. Add the following Subparagraph 3.7.6 at the end of Paragraph 3.7, Permits, Fees, Notices, and Compliance with Laws:

3.7.6 The Contractor shall obtain a Certificate of Occupancy from the Building Inspection Department having jurisdiction for each phase of the project as it is completed and ready for occupancy and shall deliver such certificate to the Architect.

1.06 SUBMITTALS

- A. Add the following Subparagraphs 3.12.11 and 3.12.12 at the end of Paragraph 3.12, Shop Drawings, Product Data and Samples:

3.12.11 Additional provisions pertaining to shop drawings and samples are included in Division 1, General Requirements.

3.12.12 Submittals that have not been marked as reviewed, signed, and dated by the Contractor may be returned by the Architect without action.

1.07 SUBCONTRACTURAL RELATIONS

- A. Add the following Subparagraphs 5.3.1 and 5.3.2 to Paragraph 5.3, Subcontractual Relations:

5.3.1 The Contractor shall be directly responsible for all of the work included in the Contract, whether performed by his own forces or by his subcontractors. Except in extreme emergencies, all instructions, clarifications, and approvals will be given by the Architect to subcontractors only through the Contractor and all shop drawings, samples, and correspondence from the subcontractor shall be submitted to the Architect through the Contractor.

5.3.2 Insofar as it does not affect the quality of workmanship or materials, the Contractor shall settle all questions of responsibility arising among his various subcontractors and shall determine the extent of work and responsibility of each of the subcontractors.

1.08 CHANGES IN THE WORK

- A. Change Sub-subparagraph .5 of Subparagraph 7.3.4 to the following:

.5 Overhead and profit of which the maximum amount of allowable given in this Subparagraph shall be considered to include, but is not limited to, job-site staff and office expense, incidental job burdens, small tools, bonds, insurance and home office overhead allocation. The percentages for overhead and profit shall not exceed the following:

To Contractor on work performed by other than its own forces - 5% profit;

To first-tier Subcontractor on work performed by its Sub-subcontractors - 5% profit; and

To Contractor and/or Subcontractors for that portion of the work performed with their respective forces - 10% overhead and 5% profit.

- B. Add the following Subparagraph 7.4.1 to Paragraph 7.4, Minor Changes in the Work:

7.4.1 In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials, and subcontractors. **Where major cost items are subcontracts, they shall be itemized also. In no case will a change involving over \$500.00 be approved without such itemization.**

1.09 APPLICATIONS FOR PAYMENT

- A. Add the following Clauses 9.3.4 and 9.3.5, in Paragraph 9.3, Applications for Payment:

9.3.4 Until Substantial Completion, the Owner will pay ninety five percent (95%) of the amount due the Contractor on account of progress payments, holding the remaining five percent (5%) of the amount of such Contract as retainage. At Substantial Completion and with the full knowledge of the Contractor's Surety, retainage will be reduced to an amount sufficient in the Architect's opinion to complete the Work should the Contractor default.

9.3.5 The Contractor is to use the 1992 Edition of AIA Document G702, Application and Certificate for Payment. **Beginning with the second Application for Payment, the Contractor shall verify that he has paid all subcontractors and major material suppliers those respective amounts representing all work and materials which have formed the basis of previous progress payments.** The application shall be submitted in three notarized copies.

1.10 PROGRESS PAYMENTS

- A. Revise Subparagraph 9.6.1, to read as follows:

Unless otherwise provided in the agreement, the Owner will make progress payments to the Contractor on or about the fifteenth (15<sup>th</sup>) day of each calendar month on the basis of a duly certified and approved estimate of the work performed during the preceding calendar month. In preparing estimates, materials delivered to and properly stored on the site shall be given consideration. **Materials stored off-site shall not be paid for by the Owner unless the Contractor furnishes a certificate of insurance for that material showing the Owner as the Owner of said material.**

- 1.11 Add Subparagraph 9.6.9 at the end of Subparagraph 9.6, Progress Payments.

9.6.9 Upon commencement of the work, an escrow account as provided by Tennessee Code Annotated, Section 4-15-102; Section 66-11-144 and Title 66, Chapter 34, shall be established in a financial institution chosen by the Contractor and approved by the Owner. The escrow agreement shall provide that the financial institution will act as escrow agent, will pay interest on funds deposited in such account in accordance with provisions of the escrow agreement and will disburse funds from the account upon the direction of the Owner as set forth below. Compensation to the escrow agent for establishing and maintaining the escrow account shall be paid from interest accrued to the escrow account.

1.12 COSTS FOR DELAYS IN SUBSTANTIAL COMPLETION

- A. Add the following Subparagraph 9.8.6 at the end of Paragraph 9.8, Substantial Completion:

9.8.6 As actual damages for any delay in completion are impossible of determination, the Contractor and his sureties shall be liable for and shall pay to the Owner the sum of Five Hundred Dollars (\$500.00) as fixed, agreed, and liquidated damages for each calendar day of delay until a Certificate of Substantial Completion is executed by the Owner, Architect, and Contractor.

1.13 FINAL PAYMENT

- A. In Subparagraph 9.10.2, item (6), delete the words "if required by the Owner"; and replace the words "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" with the following: "Contract Close Out Submittals as enumerated in Section 01 33 00 Submittal Procedures and as reviewed and approved by the Architect.

1.14 COSTS FOR DELAYS IN FINAL COMPLETION

- A. Add the following Subparagraph 9.10.6 at the end of Paragraph 9.10, Final Completion and Final Payment:

9.10.6 If after Substantial Completion of the work and issuance of the Punch List, Final Completion of the Work is delayed beyond the time allotted for completion of the Punch List through no fault of the Owner or the Architect, the Contractor shall be liable for such ongoing costs as the Architect shall incur on the Project. Such costs shall be computed and billed to the Contractor at the Architect's standard hourly rates in effect at the time the work is executed. Payment shall be required within thirty (30) days of invoice. Interest shall accrue at one percent (1%) per month on past due amounts. Contractor shall be liable for all legal fees if legal action is required for collection of unpaid amounts.

1.15 CONTRACTOR'S LIABILITY INSURANCE

- A. In Subparagraph 11.1.1 in the second line, following the phrase "in the jurisdiction where the Project is located", insert the following clause: ", and to which the Owner has no reasonable objections,".

1.16 LIMITS OF CONTRACTOR'S LIABILITY INSURANCE

Add the following Clause 11.1.2.1 to Subparagraph 11.1.2:

11.1.2.1 The insurance required by Subparagraph 11.1.1 shall be written for not less than the following limits, or greater if required by law:

- A. Workmen's Compensation:
- |    |                       |                                      |
|----|-----------------------|--------------------------------------|
| 1. | State:                | Statutory                            |
| 2. | Employer's Liability: | \$100,000.00 Each Accident           |
|    |                       | \$500,000.00 Disease - Policy Limit  |
|    |                       | \$100,000.00 Disease - Each Employee |
- B. Comprehensive General Liability (including Premises-Operations; Independent Contractors' Products/Completed Operations; Contractual; Personal injury):
- Bodily Injury & Property Damage, combined single limit:  
Each Occurrence: \$1,000,000.00  
Annual Aggregate: \$1,000,000.00
  - Products/Completed Operations to be maintained for One Year after Final Payment.  
\$5,000,000.00 Aggregate
  - Property Damage Liability Insurance shall provide X, C, and U Coverage, and Coverage for any Special Hazards such as Blasting.
- C. Comprehensive Automobile Liability (including Owned, Hired and Non-Owned):
- Bodily Injury/Property Damage Combined: \$500,000
- D. Umbrella Liability: \$2,000,000
- 1.17 PROPERTY INSURANCE (BUILDER'S RISK)
- A. Use 11.2: Owner to provide property insurance.

1.18 PERFORMANCE BOND AND PAYMENT BOND

A. Change Subparagraph 11.1.2 to read as follows:

11.1.2 The Contractor shall execute a performance bond and a payment bond in an amount equal to one hundred percent (100%) of the Contract Sum and a payment bond covering and including labor and materials in an amount equal to one hundred percent (100%) of the Contract Sum. Bond shall be executed on AIA Document A311 and A312. Such bond shall be from a surety Company authorized to transact business in the State of Tennessee and Company shall be registered in Federal Register, Department of the Treasury, Fiscal Service, Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies; Notice. Attorneys in Fact who sign any bonds must file with each instrument a certified and effective dated copy of their power of attorney.

B. Add the following Subparagraph 11.1.2.1 to the end of Subparagraph 11.1.2:

11.1.2.1 Mechanical, Plumbing and Electrical Subcontractors shall execute a performance bond in an amount equal to one hundred percent of the Contract Value of their portion of the work and a payment bond covering and including labor and materials in an amount equal to one hundred percent (100%) of the Contract Value of their portion of the work. Performance and Labor and Material Payment Bonds shall be executed on AIA Form A311 and A312. Such bond shall be from a surety Company authorized to transact business in the State of Tennessee and Company shall be registered in Federal Register, Department of the Treasury, Fiscal Service, Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies; Notice. Attorneys in Fact who sign any bonds must file with each instrument a certified and effective dated copy of their power of attorney.

1.19 INSPECTIONS AND CORRESPONDENCE

A. Add the following Subparagraph 13.4.7 to the end of Paragraph 13.4, Tests and Inspections:

13.4.7 Inspections and or correspondence by the Architect required due to failure by the Contractor to obtain inspections and approval from the Public Authorities having jurisdiction are beyond the scope of Construction Contract Administration for the Architect. As additional services, the Contractor will be billed a minimum fee of Five Hundred Dollars (\$500.00) per occurrence plus the Architect's time at the Architect's standard hourly rate for the personnel required to perform these functions.

1.20 INTEREST

A. Revise Paragraph 13.5 to read as follows:

"Payments due and unpaid for thirty (30) days under the Contract Documents shall bear interest from the date thirty (30) days after payment is due at the rate of 1/2% (0.5 percent) per month; 6% APR.

1.21 ARBITRATION

A. Delete Paragraph 15.4 Arbitration, entirely and delete all references to arbitration elsewhere in the General Conditions.

1.22 TIME

A. Time is an essential consideration of the Contract and work shall commence on the date to be specified in a written notice to the Contractor to proceed and shall progress with a proper and sufficient force of workmen and ample supply of materials and equipment to complete the Contract within the time limit agreed to in the Contract for Construction.

1.23 SUBSTITUTIONS

A. All requests shall be submitted to the Architect in writing with a fully executed substitution request form and shall clearly define and describe materials, methods or equipment for which approval is requested.

- B. Prior to Execution of a Contract for Construction:
1. If any Contractors desire to substitute any firms, materials, brands, methods, etc., other than specified, he may have the privilege at any time prior to ten days before bidding, of submitting these matters to the Architect for approval.
  2. Requests shall be submitted by the General Contractor. Direct requests by manufacturer or material suppliers will not be considered.
  3. If such submissions are approved by the Architect or if the Architect shall decide to enlarge the scope of the Specifications, such approvals or additional information will be made by Addendum to the Contractor.
- C. After Execution of a Contract for Construction:
1. Substitutions after execution of a Contract for Construction will, generally, not be considered, except under unusual circumstances, such as strikes, lockouts, bankruptcy, discontinuing of a product, etc.
  2. Requests for substitutions shall be made in writing to the Architect within ten (10) days of the date that the Contractor ascertains that he cannot obtain the material or equipment specified.
  3. Requests shall be accompanied by complete description of the material or apparatus to be submitted. On request from the Architect, samples of any of all such items shall be submitted and/or set up as directed for inspection and consideration. The amount of credit or extra cost to the Owner on account of the substitution shall be a part of this request.
    - a. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
      - i. Statement indicating why specified material or product cannot be provided.
      - ii. The amount of credit or extra cost to the Owner on account of the substitution
      - iii. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
      - iv. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
      - v. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
      - vi. Samples, where applicable or requested.
      - vii. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
      - viii. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
      - ix. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
      - x. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
      - xi. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
- D. "Or Approved Equal" or "Or Approved Substitution"
1. Where the phrase "or approved equal" or "approved substitution" occurs in the Contract Documents, do not assume that material, equipment, or methods will be approved as equal by the Architect unless the item has been specifically approved for this work by the Architect
    - a. Color choices will be one of the determining factors for approval.
  2. The decision of the Architect will be final.

1.01 STANDARDS

- A Any material or other work specified by reference to the number, symbol, or title of a specific standard, such as American National Standards Institute (ANSI) Standard, a Federal Specification, a trade association standard, or other similar standard, shall conform to the requirements in the latest revision thereof or any amendment or supplement thereto in effect on the date of the drawings and specifications, except as limited to type, class or grade, or as modified in such reference.
- B The standards referred to, except as modified in the specification, shall have full force and effect as though recited for the reason that the manufacturers and trades involved are assumed to be familiar with their requirements. The Architect will furnish, upon request, information as to how copies of the standards referred to may be obtained.
- C Where material or work is specified by reference to conform to standards such as listed in Paragraph A above, or to Codes, Laws, and Regulations, but specific provisions of the Contract Drawings or Contract Specifications exceed the requirements of such references, the Contract Drawings and Specifications shall govern.

1.02 MANUFACTURER'S DIRECTIONS

- A All manufactured articles, material and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the manufacturer's instructions and recommendations. Any conflicts between such manufacturer's instructions and recommendations and the specifications shall be brought to the attention of the Architect and the procedures reconciled before proceeding with the work.

1.03 GUARANTEE

- A All work under this Contract shall be guaranteed for a period of one (1) year after execution of Certificate of Substantial Completion against defects caused by the use of inferior materials or workmanship. Guarantee period of incomplete items at time of execution of Certificate of Substantial Completion shall commence on date of installation into building. Repair and/or replace all such defective materials or equipment and any work damaged thereby or make any other adjustment necessary without additional cost to the Owner.

1.04 LAYING OUT WORK

- A The Contractor shall, immediately upon entering the projects for the purpose of beginning work, locate all general reference points and be responsible for all lines, elevations, and measurements.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION



PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnish all labor, materials, and equipment, and perform all work to construct, as specified herein and as shown on the accompanying drawings entitled "A New School For: Claxton Elementary School, 105 Fellowship Lane, Powell, TN 37849." The building shall be constructed complete and ready for occupancy except for the items specifically excluded in "Work Not Included".
- B. The work shall include selective demolition, site preparation, building construction, plumbing, heating, ventilating and air conditioning; electrical work; special equipment as specified; furnishings, and site improvements as shown and specified.
- C. Patch any existing work damaged by construction.

1.02 WORK NOT INCLUDED

- A. The following items of work will be provided by the Owner or by others under separate contracts:
  - 1. Wayfinding signage.
  - 2. Toilet accessories not included on drawings: OFCI.
  - 3. Movable furniture unless specifically shown on the drawings and specifications.
  - 4. Security System Equipment.
  - 5. Telephone System Equipment.
  - 6. Computer System Equipment.
  - 7. Point of Sale Equipment.
  - 8. Any other items noted on the drawings as Not in Contract (NIC); or Owner Furnished Contractor Installed (OFICI).
- B. The following work in connection with the items listed in paragraph 1.02A preceding shall be part of the General Contract work:
  - 1. Verification of correct location of electrical receptacles, telephone outlets, water and waste connections and similar outlets to suit equipment arrangement.
  - 2. Provision of telephone outlet boxes and conduit turned out above ceiling for use by owner's telephone contractor.

1.03 OCCUPANCY OF THE BUILDING DURING CONSTRUCTION

- A. The Contractor shall schedule and organize his work in such a manner and use such methods that will interfere as little as possible with other work in progress on the site and with the operation of adjacent buildings.
- B. The Building will be occupied during the course of construction. The Contractor shall schedule his work in a manner to minimize disruption of use of existing facilities by his construction activities

1.04 CONTRACTOR'S USE OF PREMISES

- A. Before construction is started the Contractor shall confer with the Architect and the Owner and arrange for available trucking and storage space for the delivery of materials, storage space for materials and equipment, and parking space for his workmen.
- B. Construction operations and storage of materials and equipment shall be restricted to areas of the site mutually agreed upon and in such a manner as not to block access of fire fighting equipment to the building and facilities.

- C. Construction vehicular traffic and the operation of construction equipment such as cranes, bulldozers, and other similar equipment shall be carefully supervised and controlled to avoid damage to existing structures and facilities which are to remain in place.

1.05 VERIFICATION OF DIMENSIONS

- A. Dimensions, elevations, and locations shown on the drawings in reference to existing structures and utilities are the best available data obtainable but are not guaranteed by the Architect or the Owner and the Architect and the Owner will not be responsible for their accuracy.
- B. Before proceeding with any work dependent upon the data involved, the Contractor shall field check and verify all dimensions, grades, line levels, or other conditions of limitations at the site and building to avoid construction errors. If any work is performed by the Contractor or by his Subcontractors prior to adequate verification of applicable data, any resultant extra cost for adjustment of work to conform to existing limitations shall be borne by the Contractor without reimbursement or compensation by the Owner.

1.06 CONTROL POINTS AND LAYOUT

- A. The initial lines, grades, and dimensions necessary for the location and control of the work under the Contract are shown on the Contract Drawings.
- B. The Contractor shall provide for himself all additional and supplementary lines and grades as may be necessary to layout the work and ensure proper control of the work until completed. It shall be the Contractor's responsibility to satisfy himself as to the accuracy of all measurements before construction.

1.07 SUBSTANTIAL COMPLETION OF THE WORK

- A. Upon substantial completion of any phase of the work, the Owner shall assume complete responsibility for the maintenance and operation of the heating, ventilating and air conditioning system and service utilities in that portion of the project.
- B. The Owner shall also become responsible for all other maintenance and damage and ordinary wear and tear and, with the exception of items under guarantee, the cost of repairs or restoration during the period between substantial and final completion.
- C. The Owner shall have the responsibility to have in effect all necessary insurance for protection against any losses not directly attributable to the Contractor's negligence.
- D. Upon substantial completion, payments for work in the substantially complete portion of the work shall be released to the Contractor, except for the retainage and an amount to cover the cost of the incomplete or deficient items included in the punch list made at the inspection to determine substantial completion. This amount shall be approximately the value of the punch list items as estimated by the Architect.
- E. The Contractor shall arrange a schedule so that punch list items are completed in the designated time by working during regular working hours. The Contractor shall be afforded access to the occupied portion of the building to perform this work during regular working hours.

1.08 ENVIRONMENTAL HAZARDOUS PRODUCTS, MATERIALS, WASTE

- A. Do not incorporate in the Work hazardous materials or products as currently defined in the Resource Conservation and Recovery Act of 1976 (RCRA), the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), or Environmental Protection Agency (EPA) regulations, rules, or requirements, as amended, unless the Contract Documents give no other option than to provide a material or product which contains a hazardous material, component, constituent, waste, or leachate. In studying the Contract Documents and carrying out the Work, report at once to the Designer the

discovery of a product or material which contains hazardous materials, components, constituents, waste, or leachate.

- B. Do not incorporate in the Work a product or material which contains concentrations of a constituent, component, or material above the threshold levels which would require adherence to hazardous waste disposal regulations as currently defined, or could cause a release or threat of release of a hazardous substance at a level that would require a remedial response or removal action as currently defined by RCRA, CERCLA, or the EPA.
- C. Select materials and products meeting specified requirements which comply with EPA requirements as regards hazardous materials content. In making requests for substitutions, determine that materials and products proposed for substitution comply with RCRA, CERCLA, and EPA requirements.

#### 1.09 BUILDING PRODUCTS USE

- A. It is the responsibility of the Contractor to inform himself concerning the application of the products he uses to follow the directions of the Architect and manufacturer.
- B. In the event of disagreement between the Contract Documents and the manufacturer's directions, the Contractor will obtain written instructions from the Architect before proceeding with the installation.
- C. If the Contractor has knowledge of or reason to believe the likelihood of failure, he will transmit such knowledge to the Architect, and ask for written instructions before proceeding with the work.

#### 1.10 OWNERSHIP OF REMOVED MATERIALS AND EQUIPMENT

- A. All removed existing materials and equipment designated to be removed which are not to remain the property of the Owner or are not noted to be reused in the new work shall become the property of the Contractor and shall be removed from the premises and site and disposed of by him.

#### 1.11 SEPARATE CONTRACTS

- A. The Owner may award separate contracts in connection with the project. The work in any such separate contracts may proceed simultaneously with the execution of this Contract. The Contractor shall coordinate operations with any separate contractors. The Contractor will be required in the arrangement for the storage of materials and in the detailed execution of the work. The Contractor, including his subcontractors, shall keep himself informed of the progress and the detailed work of separate contractors and shall notify the Architect immediately of the lack of progress or defective workmanship that will interfere with his own operations. Failure of the Contractor to keep informed of the work progressing on the site and failure to give notice of lack of progress or defective workmanship by separate contractors shall be construed as acceptance of him of the state of the work as being satisfactory for proper coordination with his own work.
- B. The separate contractors will provide competent foremen or supervisors for the installation of their equipment and they are to confer with the Contractor and his subs and other separate contractors where required in regard to connections and installations.

#### 1.12 DISCRETIONARY FUND

- A. The General Contractor shall include in the base bid an amount equal to **four percent (4%)** of the Base Bid amount which shall constitute a discretionary fund. This fund shall be used at the discretion of the Architect and the Owner. Upon completion of the work, the Contractor shall credit his final request for payment in the amount of all or any unused portion of this fund.

MBI #230042.02  
ANDERSON COUNTY BID # 2521

SECTION 01 10 00  
SUMMARY

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes administrative and procedural requirements governing Allowances.
- B. Allowances included on the drawings or in individual specification sections not specifically listed herein shall be bound by the procedures described herein. The Schedule of Allowances may not be a comprehensive list of all Allowances to be included in the Bid.

1.02 RELATED DOCUMENTS

- A. Applicable provisions of the General Conditions, Supplementary Conditions, and Division 1 General Requirements apply to the work under this section.

1.03 ALLOWANCES

- A. Types of allowances include the following:
  - 1. Allowances as listed hereafter.
  - 2. Discretionary Fund/Contingency Allowance.
- B. Selection and Purchases:
  - 1. At the earliest practical date after award of the Contract, advise the Architect of the date when the final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
  - 2. At the Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
  - 3. Purchase products and systems selected by the Architect from the designated supplier.
- C. Submittals:
  - 1. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
  - 2. Submit invoices or delivery slips to show the actual quantities of materials delivered to the site for use in fulfillment of each allowance.
  - 3. The Owner reserves the right to reject the Contractor's measurement of work-in-place that involves use of established unit costs, and to have this work measured, at the Owner's expense, by an independent surveyor acceptable to the Contractor.
  - 4. Schedule: A "Schedule of Allowances" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials described under each Allowance.
- D. Discretionary Fund/Contingency Allowance:
  - 1. Use the discretionary fund only as directed by the Architect for the Owner's purposes and only by Field Orders Construction Change Directive (AIA Document G714) which indicate amounts to be charged to the allowance.
  - 2. The Contractor's related costs for products and equipment ordered by the Owner under the discretionary fund are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.
  - 3. Field Orders Construction Change Directive (AIA Document G714) authorizing use of funds from the discretionary fund will include Contractor's related costs and reasonable overhead and profit margins.
  - 4. At Project closeout, credit unused amounts remaining in the discretionary fund to the Owner by Change Order.
- E. Unused Materials:
  - 1. Return unused materials to the manufacturer or supplier for credit to the Owner, after installation has been completed and accepted.

2. When requested by the Architect, prepare unused material for storage by Owner where it is not economically practical to return the material for credit. When directed by the Architect, deliver unused material to the Owner's storage space. Otherwise, disposal of unused material is the Contractor's responsibility.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SCHEDULE OF ALLOWANCES

- A. Allowance No. 1: Unsuitable Soil in Mass Excavation:
  1. Description: Allowance included in the Base Bid for the removal and disposal of 2,000 cubic yards of unsuitable soil in mass excavation and replacement with compacted Engineered Fill according to Section 31 20 00 Earth Moving.
- B. Allowance No. 2: Unsuitable Soil in Trench Excavation:
  1. Description: Allowance included in the Base Bid for the removal and disposal of 200 cubic yards of unsuitable soil in trench excavation and replacement with compacted Stone Fill according to Section 31 20 00 Earth Moving.
- C. Allowance No. 3: Rock in Mass Excavation:
  1. Description: Allowance included in the Base Bid for the removal and disposal of 250 cubic yards of rock in mass excavation according to Section 31 20 00 Earth Moving.
- D. Allowance No. 4: Rock in Trench Excavation:
  1. Description: Allowance included in the Base Bid for the removal and disposal of 50 cubic yards of rock in trench excavation according to Section 31 20 00 Earth Moving.
- E. Allowance No. 5: Compacted Stone:
  1. Description: Allowance included in Base Bid for providing and installing 200 tons of compacted stone according to Section 31 20 00 Earth Moving.
- F. Allowance No. 6: Discretionary Fund Allowance
  1. Description: Allowance included in Base Bid for use at the discretion of the Owner and the Architect according to Section 01 10 00 Summary of the Work.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

- A This Section includes administrative and procedural requirements for submittal and approval of substitutions.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions, and other Division 1, General Requirements, apply to the work under this section.

1.03 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
  2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.04 SUBMITTALS

- A. Substitution Requests: Submit a PDF of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Substitution Request Form: Use form provided in the Project Manual.
  2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
    - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
    - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
    - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
      - i. Operational efficiency and energy consumption for equipment and appliances.
    - e. Samples, where applicable or requested.
    - f. Certificates and qualification data, where applicable or requested.
    - g. List of similar installations if requested, for completed projects with project names and addresses and names and addresses of architects and owners.
    - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
    - i. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
    - j. Cost information, including a proposal of change, if any, in the Contract Sum.
    - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with

related materials, and is appropriate for applications indicated.

- l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven (7) days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within fifteen (15) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.
  - a. Forms of Acceptance: Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
  - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

#### 1.05 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage qualified testing agency to perform compatibility tests recommended by manufacturers.

#### 1.06 PROCEDURES

- A. Coordination: Modify or adjust affected work as necessary to integrate work of the approved substitutions.

### PART 2 PRODUCTS

#### 2.01 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than fifteen (15) days prior to time required for preparation and review of related submittals.
  1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - b. Substitution request is fully documented and properly submitted.
    - c. Requested substitution will not adversely affect Contractor's construction schedule.
    - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - e. Requested substitution is compatible with other portions of the Work.
    - f. Requested substitution has been coordinated with other portions of the Work.
    - g. Requested substitution provides specified warranty.
    - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
  2. Submit confirmation of the above requirements on 00 63 25 - Substitution Request Form included in this project manual.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 10 days prior to the date of the Bid. Requests received after that time may be considered or rejected at discretion of Architect.
  1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner

- must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
- b. Requested substitution does not require extensive revisions to the Contract Documents.
  - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
  - d. Substitution request is fully documented and properly submitted.
  - e. Requested substitution will not adversely affect Contractor's construction schedule.
  - f. Requested substitution has received necessary approvals of authorities having jurisdiction if applicable.
  - g. Requested substitution is compatible with other portions of the Work.
  - h. Requested substitution has been coordinated with other portions of the Work.
  - i. Requested substitution provides specified warranty.
  - j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
2. Submit confirmation of the above requirements on 00 63 25 - Substitution Request Form included in this project manual.

PART 3 EXECUTION - NOT USED

END OF SECTION



PART 1 GENERAL

1.01 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
  - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
  - 2. Section 01 21 00 - Allowances: For procedural requirements governing the handling and processing of allowances.
  - 3. Section 01 32 00 - Construction Progress Documentation: For administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.02 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.03 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
  - 1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
  - 2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
  - 3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.
  - 4. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.
  - 5. Subschedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide subschedules showing values coordinated with the scope of each design services contract, as described in Section 01 10 00 - Summary.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
  - 1. Identification: Include the following Project identification on the schedule of values:
    - a. Project name and location.
    - b. Name of Architect.
    - c. Architect's Project number.
    - d. Contractor's name and address.
    - e. Date of submittal.
  - 2. Arrange schedule of values consistent with format of AIA Document G703.
  - 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
  - 4. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
    - a. Differentiate between items stored on-site and items stored off-site.

5. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
6. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate Owner payments or deposits, if any, and balance to be paid by Contractor.
7. Overhead Costs: Include total cost and proportionate share of general overhead and profit for each line item.
8. Overhead Costs: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
9. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
10. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.04 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Submit Application for Payment to Architect by the last day of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
  1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.
- D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
  1. Other Application for Payment forms proposed by the Contractor shall be acceptable to Architect and Owner. Submit forms for approval with initial submittal of schedule of values.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
  1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
  2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
  3. Include amounts of Change Orders and Construction Change Directives issued and signed, or authorized, before last day of construction period covered by application.
  4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
  1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
  2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
  3. Provide summary documentation for stored materials indicating the following:

- a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
  - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
  - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- G. Transmittal: Submit a PDF of each Application for Payment to Architect by email. Include waivers of lien and similar attachments if required.
  1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
  1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  2. When an application shows completion of an item, submit conditional final or full waivers.
  3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
  5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
  1. List of subcontractors.
  2. Schedule of values.
  3. Contractor's construction schedule (preliminary if not final).
  4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
  5. Products list (preliminary if not final).
  6. Sustainable design action plans, including preliminary project materials cost data.
  7. Schedule of unit prices.
  8. Submittal schedule (preliminary if not final).
  9. List of Contractor's staff assignments.
  10. List of Contractor's principal consultants.
  11. Copies of building permits.
  12. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  13. Initial progress report.
  14. Report of preconstruction conference.
  15. Certificates of insurance and insurance policies.
  16. Performance and payment bonds.
  17. Data needed to acquire Owner's insurance.
- J. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
  1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
  2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- K. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
  1. Evidence of completion of Project closeout requirements.

2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706.
5. AIA Document G706A.
6. AIA Document G707.
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General administrative requirements.
- B. Preconstruction meeting.
- C. Progress meetings.
- D. Construction progress schedule.
- E. Contractor's daily reports.
- F. Progress photographs.
- G. Submittals for review, information, and project closeout.
- H. Number of copies of submittals.
- I. Requests for Information (RFI) procedures.
- J. Submittal procedures.

1.02 RELATED REQUIREMENTS

- A. Section 00 72 00 - General Conditions: Dates for applications for payment.
- B. Section 00 73 00 - Supplementary Conditions: Duties of the Construction Manager.
- C. Section 01 60 00 - Product Requirements: General product requirements.
- D. Section 01 70 00 - Execution and Closeout Requirements: Additional coordination requirements.
- E. Section 01 78 00 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.
- F. Section 01 91 13 - General Commissioning Requirements: Additional procedures for submittals relating to commissioning.
  - 1. Where submittals are indicated for review by both MBI Companies and the Commissioning Authority, submit one extra and route to MBI Companies first, for forwarding to the Commissioning Authority.
  - 2. Where submittals are not indicated to be reviewed by MBI Companies, submit directly to the Commissioning Authority; otherwise, the procedures specified in this section apply to commissioning submittals.

1.03 REFERENCE STANDARDS

- A. AIA G716 - Request for Information.
- B. AIA G810 - Transmittal Letter.
- C. CSI/CSC Form 12.1A - Submittal Transmittal; Current Edition.
- D. CSI/CSC Form 13.2A - Request for Interpretation; Current Edition.

1.04 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
- B. Make the following types of submittals to MBI Companies:
  - 1. Requests for Information (RFI).
  - 2. Requests for substitution.
  - 3. Shop drawings, product data, and samples.
  - 4. Test and inspection reports.

5. Design data.
6. Manufacturer's instructions and field reports.
7. Applications for payment and change order requests.
8. Progress schedules.
9. Coordination drawings.
10. Correction Punch List and Final Correction Punch List for Substantial Completion.
11. Closeout submittals.

## PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION

### 3.01 PRECONSTRUCTION MEETING

- A. MBI Companies will schedule a meeting after Notice of Award.
- B. Attendance Required:
  1. Owner.
  2. MBI Companies.
  3. Contractor.
- C. Agenda:
  1. Execution of Owner-Contractor Agreement.
  2. Submission of executed bonds and insurance certificates.
  3. Distribution of Contract Documents.
  4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
  5. Submission of initial Submittal schedule.
  6. Designation of personnel representing the parties to Contract, and MBI Companies.
  7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
  8. Scheduling.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to MBI Companies, Owner, participants, and those affected by decisions made.

### 3.02 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the work at maximum bi-monthly intervals.
- B. Attendance Required:
  1. Contractor.
  2. Owner.
  3. MBI Companies.
- C. Agenda:
  1. Review minutes of previous meetings.
  2. Review of work progress.
  3. Field observations, problems, and decisions.
  4. Identification of problems that impede, or will impede, planned progress.
  5. Review of submittals schedule and status of submittals.
  6. Review of RFIs log and status of responses.
  7. Review of off-site fabrication and delivery schedules.
  8. Maintenance of progress schedule.
  9. Corrective measures to regain projected schedules.
  10. Planned progress during succeeding work period.
  11. Coordination of projected progress.
  12. Maintenance of quality and work standards.
  13. Effect of proposed changes on progress schedule and coordination.

- 14. Other business relating to work.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to MBI Companies, Owner, participants, and those affected by decisions made.
- 3.03 CONSTRUCTION PROGRESS SCHEDULE
  - A. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
  - B. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
    - 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
  - C. Within 10 days after joint review, submit complete schedule.
  - D. Submit updated schedule with each Application for Payment.
- 3.04 DAILY CONSTRUCTION REPORTS
  - A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.
  - B. In addition to transmitting electronically a copy to Owner and MBI Companies, submit two printed copies at weekly intervals.
    - 1. Submit in format acceptable to Owner.
  - C. Prepare a daily construction report recording the following information concerning events at Project site and project progress:
    - 1. Date.
    - 2. High and low temperatures, and general weather conditions.
    - 3. Safety, environmental, or industrial relations incidents.
    - 4. Meetings and significant decisions.
    - 5. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Contractor's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
    - 6. Testing and/or inspections performed.
    - 7. Signature of Contractor's authorized representative.
- 3.05 PROGRESS PHOTOGRAPHS
  - A. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.
  - B. Photography Type: Digital; electronic files.
  - C. Provide photographs of site and construction throughout progress of work produced by an experienced photographer, acceptable to MBI Companies.
  - D. In addition to periodic, recurring views, take photographs of each of the following events:
  - E. Views:
    - 1. Provide non-aerial photographs from four cardinal views at each specified time, until date of Substantial Completion.
    - 2. Consult with MBI Companies for instructions on views required.
    - 3. Provide factual presentation.
    - 4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.
  - F. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
    - 1. Delivery Medium: Via email.
    - 2. File Naming: Include project identification, date and time of view, and view identification.

3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.

### 3.06 REQUESTS FOR INFORMATION (RFI)

- A. Definition: A request seeking one of the following:
  1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
  2. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.
- C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
  1. Prepare a separate RFI for each specific item.
    - a. Review, coordinate, and comment on requests originating with subs and/or materials suppliers.
    - b. Do not forward requests which solely require internal coordination between subcontractors.
  2. Prepare using an electronic version of the form appended to this section.
  3. Combine RFI and its attachments into a single electronic file. PDF format is preferred.
- D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
  1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
  2. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
    - a. Approval of submittals (use procedures specified elsewhere in this section).
    - b. Approval of substitutions (see Section - 01 60 00 - Product Requirements)
    - c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
    - d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
  3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
  4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
    - a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the MBI Companies, and any of its consultants, due to processing of such RFIs.
- E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
  1. Official Project name and number, and any additional required identifiers established in Contract Documents.
  2. Owner's, MBI Companies', and Contractor's names.
  3. Discrete and consecutive RFI number, and descriptive subject/title.
  4. Issue date, and requested reply date.
  5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
  6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
  7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific

locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

- F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- G. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
  - 1. Indicate current status of every RFI. Update log promptly and on a regular basis.
  - 2. Note dates of when each request is made, and when a response is received.
  - 3. Highlight items requiring priority or expedited response.
  - 4. Highlight items for which a timely response has not been received to date.
  - 5. Identify and include improper or frivolous RFIs.
- H. Review Time: MBI Companies will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
  - 1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.
- I. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
  - 1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
  - 2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
  - 3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
  - 4. Notify MBI Companies within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

### 3.07 SUBMITTAL SCHEDULE

- A. Submit to MBI Companies for review a schedule for submittals in tabular format.
  - 1. Submit at the same time as the preliminary schedule specified in Section - 01 32 16 - Construction Progress Schedule.
  - 2. Coordinate with Contractor's construction schedule and schedule of values.
  - 3. Format schedule to allow tracking of status of submittals throughout duration of construction.
  - 4. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
  - 5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
    - a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

### 3.08 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
  - 1. Product data.
  - 2. Shop drawings.
  - 3. Samples for selection.
  - 4. Samples for verification.

- B. Submit to MBI Companies for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

3.09 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
  - 1. Design data.
  - 2. Certificates.
  - 3. Test reports.
  - 4. Inspection reports.
  - 5. Manufacturer's instructions.
  - 6. Manufacturer's field reports.
  - 7. Other types indicated.

- B. Submit for MBI Companies' knowledge as contract administrator or for Owner.

3.10 SUBMITTALS FOR PROJECT CLOSEOUT

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

3.11 NUMBER OF COPIES OF SUBMITTALS

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by MBI Companies.
  - 1. After review, produce duplicates.
  - 2. Retained samples will not be returned to Contractor unless specifically so stated.

3.12 SUBMITTAL PROCEDURES

- A. General Requirements:
  - 1. Use a separate transmittal for each item.
  - 2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
  - 3. Transmit using approved form.
  - 4. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
  - 5. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
  - 6. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.

- a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
  7. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
    - a. Deliver submittals to MBI Companies at business address.
  8. Schedule submittals to expedite the Project, and coordinate submission of related items.
    - a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
    - b. For sequential reviews involving MBI Companies' consultants, Owner, or another affected party, allow an additional 7 days.
    - c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to MBI Companies' approval, allow an additional 30 days.
  9. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
  10. Provide space for Contractor and MBI Companies review stamps.
  11. When revised for resubmission, identify all changes made since previous submission.
  12. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
  13. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
  14. Submittals not requested will not be recognized or processed.
  15. The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Architect's approval of submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submission and the Architect has given written approval to the specific deviation. The Contractor shall not be relieved from responsibility for error or omissions in the submittals by the Architect's approval thereof.
- B. Product Data Procedures:
1. Submit only information required by individual specification sections.
  2. Collect required information into a single submittal.
  3. Submit concurrently with related shop drawing submittal.
  4. Do not submit (Material) Safety Data Sheets for materials or products.
- C. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
  2. Do not reproduce Contract Documents to create shop drawings.
  3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.
- D. Samples Procedures:
1. Transmit related items together as single package.
  2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
  3. Include with transmittal high-resolution image files of samples to facilitate electronic review and approval. Provide separate submittal page for each item image.
- 3.13 SUBMITTAL REVIEW
- A. Submittals for Review: MBI Companies will review each submittal, and approve, or take other appropriate action.
1. The Architect shall provide 2 reviews of submittals as part of the scope of work. Additional reviews required by failure of the Contractor to make indicated corrections or submit an acceptable product will be billed to the Contractor at the Architect's standard hourly rate.
- B. Submittals for Information: MBI Companies will acknowledge receipt and review. See below for actions to be taken.

- C. MBI Companies' actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
- D. MBI Companies' and consultants' actions on items submitted for review:
  - 1. Authorizing purchasing, fabrication, delivery, and installation:
    - a. "Approved", or language with same legal meaning.
    - b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
      - 1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
    - c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
      - 1) Resubmit corrected item, with review notations acknowledged and incorporated. Resubmit separately, or as part of project record documents.
      - 2) Non-responsive resubmittals may be rejected.
  - 2. Not Authorizing fabrication, delivery, and installation:
    - a. "Revise and Resubmit".
      - 1) Resubmit revised item, with review notations acknowledged and incorporated.
      - 2) Non-responsive resubmittals may be rejected.
    - b. "Rejected".
      - 1) Submit item complying with requirements of Contract Documents.
- E. MBI Companies' and consultants' actions on items submitted for information:
  - 1. Items for which no action was taken:
    - a. "Received" - to notify the Contractor that the submittal has been received for record only.
  - 2. Items for which action was taken:
    - a. "Reviewed" - no further action is required from Contractor.

END OF SECTION

## PART 1 GENERAL

### 1.01 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. Coordination drawings.
  - 3. RFIs.
  - 4. Digital project management procedures.
  - 5. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
  - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
  - 2. Section 01 32 00 - Construction Progress Documentation: For preparing and submitting Contractor's construction schedule.
  - 3. Section 01 70 00 – Execution and Closeout Requirements: For procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

### 1.02 DEFINITIONS

- A. BIM: Building Information Modeling.
- B. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

### 1.03 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
  - 1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
  - 2. Number and title of related Specification Section(s) covered by subcontract.
  - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities, list addresses and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
  - 1. Post copies of list in project meeting room, in temporary field office, in web-based Project software directory, and in prominent location in built facility. Keep list current at all times.

### 1.04 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its own operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
  3. Make adequate provisions to accommodate items scheduled for later installation.
- C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's construction schedule.
  2. Preparation of the schedule of values.
  3. Installation and removal of temporary facilities and controls.
  4. Delivery and processing of submittals.
  5. Progress meetings.
  6. Preinstallation conferences.
  7. Project closeout activities.
  8. Startup and adjustment of systems.

#### 1.05 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
    - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
    - b. Coordinate the addition of trade-specific information to coordination drawings in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
    - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.

- e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
  - f. Indicate required installation sequences.
  - g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
- 1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
  - 2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
  - 3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
  - 4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
  - 5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
  - 6. Mechanical and Plumbing Work: Show the following:
    - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    - c. Fire-rated enclosures around ductwork.
  - 7. Electrical Work: Show the following:
    - a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
    - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
    - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor-control center locations.
    - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
  - 8. Fire-Protection System: Show the following:
    - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
  - 9. Review: Architect will review coordination drawings to confirm that in general the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
  - 10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 33 00 - Submittal Procedures.

1.06 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
- 1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
  - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
  2. Project number.
  3. Date.
  4. Name of Contractor.
  5. Name of Architect.
  6. RFI number, numbered sequentially.
  7. RFI subject.
  8. Specification Section number and title and related paragraphs, as appropriate.
  9. Drawing number and detail references, as appropriate.
  10. Field dimensions and conditions, as appropriate.
  11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  12. Contractor's signature.
  13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Form: Form bound in Project Manual.
1. Attachments shall be electronic files in PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for approval of Contractor's means and methods.
    - d. Requests for coordination information already indicated in the Contract Documents.
    - e. Requests for adjustments in the Contract Time or the Contract Sum.
    - f. Requests for interpretation of Architect's actions on submittals.
    - g. Incomplete RFIs or inaccurately prepared RFIs.
  2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
  3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal.
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:
1. Project name.
  2. Name and address of Contractor.
  3. Name and address of Architect.
  4. RFI number including RFIs that were returned without action or withdrawn.
  5. RFI description.
  6. Date the RFI was submitted.
  7. Date Architect's response was received.
  8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1.07 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Use of Architect's Digital Data Files: Digital data files of Architect's BIM model or CAD drawings may be provided by Architect for Contractor's use during construction.
1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project record Drawings.
  2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
  3. Digital Drawing Software Program: Contract Drawings are available in current version of Revit.
  4. Contractor shall execute a data licensing agreement in the form of MBI Companies' Electronic Release Form included in this Project Manual.
    - a. Subcontractors, and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of MBI Companies' Electronic Files Release Form included in this Project Manual.
- B. Web-Based Project Software: Provide, administer, and use web-based Project software site for purposes of hosting and managing Project communication and documentation until Final Completion.
1. Web-based Project software site includes, at a minimum, the following features:
    - a. Compilation of Project data, including Contractor, subcontractors, Architect, architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
    - b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
    - c. Document workflow planning, allowing customization of workflow between project entities.
    - d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
    - e. Track status of each Project communication in real time, and log time and date when responses are provided.
    - f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
    - g. Processing and tracking of payment applications.
    - h. Processing and tracking of contract modifications.
    - i. Creating and distributing meeting minutes.
    - j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
    - k. Management of construction progress photographs.
    - l. Mobile device compatibility, including smartphones and tablets.
  2. Provide web-based Project software user licenses for use of Owner, Architect, and Architect's consultants. Provide software training at Architect's office for web-based Project software users.
  3. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.
  4. Provide one of the following web-based Project software packages under their current published licensing agreements:
    - a. Autodesk; Buzzsaw or Constructware.
    - b. Corecon Technologies, Inc.
    - c. Meridian Systems; Prolog.
    - d. Newforma, Inc.
    - e. Procore Technologies, Inc.
    - f. Smartsheet, Inc.
    - g. Viewpoint, Inc.; Viewpoint for Project Collaboration.
- C. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:

1. Assemble complete submittal package into a single bookmarked file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.08 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of 10 working days prior to meeting.
  2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
  3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, and Architect, within three days of the meeting.
- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Responsibilities and personnel assignments.
    - b. Tentative construction schedule.
    - c. Phasing.
    - d. Critical work sequencing and long lead items.
    - e. Designation of key personnel and their duties.
    - f. Lines of communications.
    - g. Use of web-based Project software.
    - h. Procedures for processing field decisions and Change Orders.
    - i. Procedures for RFIs.
    - j. Procedures for testing and inspecting.
    - k. Procedures for processing Applications for Payment.
    - l. Distribution of the Contract Documents.
    - m. Submittal procedures.
    - n. Sustainable design requirements.
    - o. Preparation of Record Documents.
    - p. Use of the premises and existing building.
    - q. Work restrictions.
    - r. Working hours.
    - s. Owner's occupancy requirements.
    - t. Responsibility for temporary facilities and controls.
    - u. Procedures for moisture and mold control.
    - v. Procedures for disruptions and shutdowns.
    - w. Construction waste management and recycling.
    - x. Parking availability.
    - y. Office, work, and storage areas.
    - z. Equipment deliveries and priorities.
    - aa. First aid.
    - bb. Security.
    - cc. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
  2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. Sustainable design requirements.
    - i. Review of mockups.
    - j. Possible conflicts.
    - k. Compatibility requirements.
    - l. Time schedules.
    - m. Weather limitations.
    - n. Manufacturer's written instructions.
    - o. Warranty requirements.
    - p. Compatibility of materials.
    - q. Acceptability of substrates.
    - r. Temporary facilities and controls.
    - s. Space and access limitations.
    - t. Regulations of authorities having jurisdiction.
    - u. Testing and inspecting requirements.
    - v. Installation procedures.
    - w. Coordination with other work.
    - x. Required performance results.
    - y. Protection of adjacent work.
    - z. Protection of construction and personnel.
  3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
  5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
  2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
    - a. Preparation of Record Documents.
    - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.

- c. Procedures for completing and archiving web-based Project software site data files.
    - d. Submittal of written warranties.
    - e. Requirements for completing sustainable design documentation.
    - f. Requirements for preparing operations and maintenance data.
    - g. Requirements for delivery of material samples, attic stock, and spare parts.
    - h. Requirements for demonstration and training.
    - i. Preparation of Contractor's punch list.
    - j. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    - k. Submittal procedures.
    - l. Coordination of separate contracts.
    - m. Owner's partial occupancy requirements.
    - n. Installation of Owner's furniture, fixtures, and equipment.
    - o. Responsibility for removing temporary facilities and controls.
  - 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Conduct progress meetings at regular intervals.
- 1. Coordinate dates of meetings with preparation of payment requests.
  - 2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      - 1) Review schedule for next period.
    - b. Review present and future needs of each entity present, including the following:
      - 1) Interface requirements.
      - 2) Sequence of operations.
      - 3) Resolution of BIM component conflicts.
      - 4) Status of submittals.
      - 5) Status of sustainable design documentation.
      - 6) Deliveries.
      - 7) Off-site fabrication.
      - 8) Access.
      - 9) Site use.
      - 10) Temporary facilities and controls.
      - 11) Progress cleaning.
      - 12) Quality and work standards.
      - 13) Status of correction of deficient items.
      - 14) Field observations.
      - 15) Status of RFIs.
      - 16) Status of Proposal Requests.
      - 17) Pending changes.
      - 18) Status of Change Orders.
      - 19) Pending claims and disputes.
      - 20) Documentation of information for payment requests.
  - 4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

- a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- F. Coordination Meetings: Conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
    - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
    - c. Review present and future needs of each contractor present, including the following:
      - 1) Interface requirements.
      - 2) Sequence of operations.
      - 3) Resolution of BIM component conflicts.
      - 4) Status of submittals.
      - 5) Deliveries.
      - 6) Off-site fabrication.
      - 7) Access.
      - 8) Site use.
      - 9) Temporary facilities and controls.
      - 10) Work hours.
      - 11) Hazards and risks.
      - 12) Progress cleaning.
      - 13) Quality and work standards.
      - 14) Status of RFIs.
      - 15) Proposal Requests.
      - 16) Change Orders.
      - 17) Pending changes.
  3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION



## PART 1 GENERAL

### 1.01 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
1. Startup construction schedule.
  2. Contractor's Construction Schedule.
  3. Construction schedule updating reports.
  4. Daily construction reports.
  5. Material location reports.
  6. Site condition reports.
  7. Unusual event reports.
- B. Related Requirements:
1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

### 1.02 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
  2. Predecessor Activity: An activity that precedes another activity in the network.
  3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
  2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
  3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

- G. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

### 1.03 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
1. Working electronic copy of schedule file, where indicated.

2. PDF file.
- B. Startup construction schedule.
  1. Submittal of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
  1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.
- E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
  1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
  2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
  3. Total Float Report: List of activities sorted in ascending order of total float.
  4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.
- F. Construction Schedule Updating Reports: Submit with Applications for Payment.
- G. Daily Construction Reports: Submit at monthly intervals.
- H. Material Location Reports: Submit at monthly intervals.
- I. Site Condition Reports: Submit at time of discovery of differing conditions.
- J. Unusual Event Reports: Submit at time of unusual event.
- K. Qualification Data: For scheduling consultant.

1.04 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.
- B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 - Project Management and Coordination. Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:
  1. Review software limitations and content and format for reports.
  2. Verify availability of qualified personnel needed to develop and update schedule.
  3. Discuss constraints, including phasing, work stages, area separations, interim milestones, and partial Owner occupancy.
  4. Review delivery dates for Owner-furnished products.
  5. Review schedule for work of Owner's separate contracts.
  6. Review submittal requirements and procedures.
  7. Review time required for review of submittals and resubmittals.
  8. Review requirements for tests and inspections by independent testing and inspecting agencies.

9. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.05 COORDINATION

- A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
1. Secure time commitments for performing critical elements of the Work from entities involved.
  2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.06 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
- ~~1.~~ Use Microsoft Project, Primavera, Meridian Prolog, Scheduling component of Project website software specified in Section 01 31 00 - Project Management and Coordination, or other approved software.
- B. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.
1. In-House Option: Owner may waive requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
  2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.
- C. Time Frame: Extend schedule from date established for the Notice of Award to date of Substantial Completion.
1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- D. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
1. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
  2. Submittal Review Time: Include review and resubmittal times indicated in Section 01 30 00 – Administrative Requirements in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
  3. Startup and Testing Time: Include days for startup and testing.
  4. Commissioning Time: Include days for commissioning.
  5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
  6. Punch List and Final Completion: Include days for completion of punch list items and final completion.
- E. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in the schedule and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
  2. Work under More Than One Contract: Include a separate activity for each contract.
  3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.

4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 - Summary. Delivery dates indicated stipulate the earliest possible delivery date.
  5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 - Summary. Delivery dates indicated stipulate the earliest possible delivery date.
  6. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Coordination with existing construction.
    - b. Limitations of continued occupancies.
    - c. Uninterruptible services.
    - d. Partial occupancy before Substantial Completion.
    - e. Use-of-premises restrictions.
    - f. Provisions for future construction.
    - g. Seasonal variations.
    - h. Environmental control.
  7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    - a. Subcontract awards.
    - b. Submittals.
    - c. Purchases.
    - d. Mockups.
    - e. Fabrication.
    - f. Sample testing.
    - g. Deliveries.
    - h. Installation.
    - i. Tests and inspections.
    - j. Adjusting.
    - k. Curing.
    - l. Building flush-out.
    - m. Startup and placement into final use and operation.
    - n. Commissioning.
  8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
    - a. Structural completion.
    - b. Temporary enclosure and space conditioning.
    - c. Permanent space enclosure.
    - d. Completion of mechanical installation.
    - e. Completion of electrical installation.
    - f. Substantial Completion.
- F. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, final completion, and other important milestones:
- G. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
1. See Section 01 29 00 - Payment Procedures: For cost reporting and payment procedures.
- H. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
  2. Unanswered Requests for Information.
  3. Rejected or unreturned submittals.
  4. Notations on returned submittals.

5. Pending modifications affecting the Work and the Contract Time.
- I. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
  1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
  3. As the Work progresses, indicate final completion percentage for each activity.
- J. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.
- K. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
  1. Post copies in Project meeting rooms and temporary field offices.
  2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

#### 1.07 STARTUP CONSTRUCTION SCHEDULE

- A. Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule within seven days of date established for the Notice of Award.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

#### 1.08 GANTT-CHART SCHEDULE REQUIREMENTS

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice to Proceed.
  1. Base schedule on the startup construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

#### 1.09 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
  1. List of subcontractors at Project site.
  2. List of separate contractors at Project site.
  3. Approximate count of personnel at Project site.
  4. Equipment at Project site.
  5. Material deliveries.
  6. High and low temperatures and general weather conditions, including presence of rain or snow.
  7. Testing and inspection.
  8. Accidents.

9. Meetings and significant decisions.
  10. Unusual events.
  11. Stoppages, delays, shortages, and losses.
  12. Meter readings and similar recordings.
  13. Emergency procedures.
  14. Orders and requests of authorities having jurisdiction.
  15. Change Orders received and implemented.
  16. Construction/Work Change Directives received and implemented.
  17. Services connected and disconnected.
  18. Equipment or system tests and startups.
  19. Partial completions and occupancies.
  20. Substantial Completions authorized.
- B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
- C. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
1. Submit unusual event reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

- A. Work Included: Prepare and submit request for extensions of Time based on weather conditions.
- B. Related Work:
  - 1. Documents affecting work of this Section include, but are not limited to General Conditions, Supplementary General Conditions and Sections in Division 1 of these Specifications.
  - 2. Applications for Payment.

1.02 EXTENSIONS OF CONTRACT TIME

- A. If the basis exists for an extension of Time in accordance with the General Conditions and Supplementary General Conditions, an extension of time on the basis of weather may be granted only for the number of Weather Delay Days in excess of the number of days listed in the standard Baseline for that month.

1.03 STANDARD BASELINE FOR AVERAGE CLIMATIC RANGE

- A. The State of Tennessee has reviewed weather data available from the National Oceanic and Atmospheric Administration and determined a Standard Baseline of average climatic range for the State of Tennessee.
- B. Standard Baseline shall be regarded as the normal and anticipatable number of calendar days for each month during which construction activity shall be expected to be prevented and suspended by cause of adverse weather. Suspension of construction activity for the number of days each month as listed in the Standard Baseline is included in the Work and is not eligible for extension of Contract Time.
- C. Standard Baseline for each month of the year is as follows (the anticipatable delay days follow the month):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
12	11	8	7	7	6	7	5	4	5	6	11

1.04 ADVERSE WEATHER AND WEATHER DELAY DAYS

- A. Adverse Weather is defined as the occurrence of one or more of the following conditions, substantiated by NOAA data, which prevents exterior construction activity or access to the site within twenty-four (24) hours:
  - 1. Precipitation threshold (rain, snow, or ice) in excess of one-tenth inch (0.10") liquid measure. Snow to liquid measure ratio is 10:1.
  - 2. Standing snow in excess of one inch (1.00").
- B. Additional extension of Time may be granted for drying days following periods of two or more consecutive days of precipitation for the following conditions:
  - 1. At a rate of one day extension of Time for each period of two or more consecutive days of precipitation of 1.0 inch or more (liquid measure).
  - 2. Only if there is a hindrance to site access or site work, such as excavation, backfill and footings and the like and then only when no such work is performed.
- C. A Weather Delay Day may be counted only if adverse weather prevents work on the Project for fifty percent (50%) or more of the contractor's scheduled, critical path work, including a weekend day or holiday if Contractor has scheduled construction activity that day.

1.05 DOCUMENTATION AND SUBMITTALS

- A. Contractor shall submit on a monthly basis daily job site work logs (daily reports) showing which, and to what extent, construction activities have been adversely affected by weather.

- B. Submit actual weather data, if requested by Architect to support claim for time extension, as obtained from NOAA weather reporting station nearest the project site.
- C. Use Standard Baseline data provided in this Section when documenting actual delays due to weather in excess of the average climatic range.
- D. Organize claim and documentation to facilitate evaluation of a basis of calendar month periods and submit in accordance with the procedures for Claims established in the General Conditions.
- E. Extensions of Time requested by the Contractor and approved by the Architect on the basis of conditions stated above shall be acknowledged and communicated in writing to the Contractor periodically.
- F. For extensions of Contract Time granted, a modification shall be issued in accordance with the provisions of the General Conditions, and the applicable General requirements. Modifications for extensions of Time may be issued quarterly or held to the end of the Project as appropriate based on Architect's approval of such extensions as noted in E above.
- G. Extensions of Time not requested in a timely manner by the Contractor will not be granted at a later time.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

# Submittal Cover Sheet

**Submittal No.:** \_\_\_\_\_

**Contractor:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Date: \_\_\_\_\_

**Phone:** \_\_\_\_\_

**Fax:** \_\_\_\_\_

**Project Manager:** \_\_\_\_\_

**Email:** \_\_\_\_\_

**Project Title:** \_\_\_\_\_ **Architect's Comm. No.:** \_\_\_\_\_

**Spec Section Title:** \_\_\_\_\_ **Section No.:** \_\_\_\_\_

**Sub / Supplier:** \_\_\_\_\_ **Phone:** \_\_\_\_\_

YES



NO

□

**Product is as Specified**

If not as specified attach Substitution Request Form

**Contractor's Review Stamp**

Remarks: \_\_\_\_\_

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PART 1 GENERAL

1.01 PROGRESS SCHEDULE

- A. In addition to the progress schedule required by the General Conditions, the Contractor shall also submit his proposed scheme of work for approval, describing proposed methods and sequences of work from beginning to completion of the work and their correlation with the Owner's requirements.
- B. When the Contractor's proposed sequence of work has been approved by the Owner, it shall become the time schedule for the work and shall be adhered to as closely as possible by both the Contractor and the Owner, except that mutually agreeable modifications may be made from time to time to meet unforeseen exigencies.

1.02 TIME OF PERFORMING WORK

- A. Generally, the Contractor will be permitted to conduct his work in the building and on the premises during his regular working hours.
- B. The building must have the HVAC system operational and maintained at a constant temperature prior to installing any building finishes, except metal support systems.

1.03 OBSTRUCTIONS

- A. All obstructions encountered during the construction of the Contract work shall be overcome by the Contractor by removal or alteration of work in place, by adjustments in the new work, or by temporary removal and reinstallation of existing work.

1.04 CLEANING UP

- A. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- B. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- C. Exposed Surfaces in Finished Areas: Clean exposed surfaces
- D. Upon completion of the work, remove spots, stains, dirt, and dust from finished surfaces, both new and existing, including the surfaces of all existing machinery, equipment, and exposed piping that have been soiled by the construction. Protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- E. Clean and mop hard surface flooring and resilient flooring and vacuum clean carpet flooring
- F. Wash all glass and clean plumbing fixtures, lighting fixtures, and mechanical equipment.
- G. Comply with all special cleaning instructions contained in the various other sections of the specifications.
- H. Protect new and existing surfaces from the growth and spread of mold and mildew. If mold and mildew occur, notify Architect prior to proceeding. Retain qualified testing agency to document and direct remediation. Remediate or replace surfaces to stop the growth and spread of mold and mildew as deemed necessary by a qualified testing agency acceptable to the Contractor, Owner and Architect.
  - 1. Pay for necessary testing and perform all abatement work required to remedy condition.

1.05 INSPECTION OF WORK IN PLACE

- A. The Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities. The architect is to be given advanced notification for inspection of Structural, Mechanical, Plumbing, and Electrical work prior to said work being covered.
- B. Contractor shall give architect advanced notification for final inspection punch list prior to Owner occupying space.

1.06 SMOKING AND FIRE PRECAUTIONS

- A. No fire, or use of any fire, or explosion-producing tools or equipment will be permitted on the property
- B. This facility is a designated non-smoking facility. Smoking will not be permitted in the facility or within 20 feet of any entrance.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittals.
- B. Quality assurance.
- C. References and standards.
- D. Testing and inspection agencies and services.
- E. Contractor's construction-related professional design services.
- F. Contractor's design-related professional design services.
- G. Control of installation.
- H. Mock-ups.
- I. Tolerances.
- J. Manufacturers' field services.
- K. Defect Assessment.

1.02 RELATED REQUIREMENTS

- A. Document 00 72 00 - General Conditions: Inspections and approvals required by public authorities.
- B. Section 01 21 00 - Allowances: Allowance for payment of testing services.
- C. Section 01 30 00 - Administrative Requirements: Submittal procedures.
- D. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1.03 REFERENCE STANDARDS

- A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants.
- B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation.
- C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry.
- D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
- F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing.
- G. ASTM E699 - Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components.
- H. IAS AC89 - Accreditation Criteria for Testing Laboratories.

1.04 DEFINITIONS

- A. Contractor's Quality Control Plan: Contractor's management plan for executing the Contract for Construction.
- B. Contractor's Professional Design Services: Design of some aspect or portion of the project by party other than the design professional of record. Provide these services as part of the Contract for Construction.
  - 1. Design Services Types Required:

- a. Construction-Related: Services Contractor needs to provide in order to carry out the Contractor's sole responsibilities for construction means, methods, techniques, sequences, and procedures.
    - b. Design-Related: Design services explicitly required to be performed by another design professional due to highly-technical and/or specialized nature of a portion of the project. Services primarily involve engineering analysis, calculations, and design, and are not intended to alter the aesthetic aspects of the design.
  - C. Design Data: Design-related, signed and sealed drawings, calculations, specifications, certifications, shop drawings and other submittals provided by Contractor, and prepared directly by, or under direct supervision of, appropriately licensed design professional.
- 1.05 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES
- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
  - B. Provide such engineering design services as may be necessary to plan and safely conduct certain construction operations, pertaining to, but not limited to the following:
    - 1. Temporary sheeting, shoring, or supports.
    - 2. Temporary scaffolding.
    - 3. Temporary bracing.
    - 4. Temporary falsework for support of spanning or arched structures.
    - 5. Temporary foundation underpinning.
    - 6. Temporary stairs or steps required for construction access only.
    - 7. Temporary hoist(s) and rigging.
    - 8. Investigation of soil conditions to support construction equipment.
- 1.06 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES
- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
  - B. Base design on performance and/or design criteria indicated in individual specification sections.
    - 1. Submit a Request for Information to MBI Companies if the criteria indicated are not sufficient to perform required design services.
  - C. Scope of Contractor's Professional Design Services: Provide for the following items of work:
    - 1. Structural Design of Formwork: As described in Section 03 10 00 - Concrete Forming and Accessories.
    - 2. Concrete Mix Design: As described in Section 03 30 00 - Cast-in-Place Concrete. No specific designer qualifications are required.
    - 3. Structural Design of Signage Structure and Anchorage: As described in Section 10 14 00 – Dimensional Letter Signage.
- 1.07 SUBMITTALS
- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
  - B. Designer's Qualification Statement: Submit for MBI Companies' knowledge as contract administrator, or for Owner's information.
    - 1. Include information for each individual professional responsible for producing, or supervising production of, design-related professional services provided by Contractor.
      - a. Full name.
      - b. Professional licensure information.
      - c. Statement addressing extent and depth of experience specifically relevant to design of items assigned to Contractor.

- C. Design Data: Submit for MBI Companies' knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
    - 1. Include calculations that have been used to demonstrate compliance to performance and regulatory criteria provided, and to determine design solutions.
    - 2. Include required product data and shop drawings.
    - 3. Include a statement or certification attesting that design data complies with criteria indicated, such as building codes, loads, functional, and similar engineering requirements.
    - 4. Include signature and seal of design professional responsible for allocated design services on calculations and drawings.
  - D. Test Reports: After each test/inspection, promptly submit two copies of report to MBI Companies and to Contractor.
    - 1. Include:
      - a. Date issued.
      - b. Project title and number.
      - c. Name of inspector.
      - d. Date and time of sampling or inspection.
      - e. Identification of product and specifications section.
      - f. Location in the Project.
      - g. Type of test/inspection.
      - h. Date of test/inspection.
      - i. Results of test/inspection.
      - j. Compliance with Contract Documents.
      - k. When requested by MBI Companies, provide interpretation of results.
    - 2. Test report submittals are for MBI Companies' knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
  - E. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to MBI Companies, in quantities specified for Product Data.
    - 1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
    - 2. Certificates may be recent or previous test results on material or product, but must be acceptable to MBI Companies.
  - F. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
  - G. Manufacturer's Field Reports: Submit reports for MBI Companies' benefit as contract administrator or for Owner.
    - 1. Submit report in duplicate within 30 days of observation to MBI Companies for information.
    - 2. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.
  - H. Erection Drawings: Submit drawings for MBI Companies' benefit as contract administrator or for Owner.
    - 1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.
    - 2. Data indicating inappropriate or unacceptable Work may be subject to action by MBI Companies or Owner.
- 1.08 QUALITY ASSURANCE
- A. Testing Agency Qualifications:

1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
  2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
  3. Qualification Statement: Provide documentation showing testing laboratory is accredited under IAS AC89.
- B. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of Contractor by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- C. Contractor's Quality Control (CQC) Plan:
1. Prior to start of work, submit a comprehensive plan describing how contract deliverables will be produced. Tailor CQC plan to specific requirements of the project. Include the following information:
    - a. Management Structure: Identify personnel responsible for quality. Include a chart showing lines of authority.
      - 1) Include qualifications (in resume form), duties, responsibilities of each person assigned to CQC function.
    - b. Management Approach: Define, describe, and include in the plan specific methodologies used in executing the work.
      - 1) Management and control of documents and records relating to quality.
      - 2) Communications.
      - 3) Coordination procedures.
      - 4) Resource management.
      - 5) Process control.
      - 6) Inspection and testing procedures and scheduling.
      - 7) Control of noncomplying work.
      - 8) Tracking deficiencies from identification, through acceptable corrective action, and verification.
      - 9) Control of testing and measuring equipment.
      - 10) Project materials certification.
      - 11) Managerial continuity and flexibility.
    - c. Owner will not make a separate payment for providing and maintaining a Quality Control Plan. Include associated costs in Bid price.
    - d. Acceptance of the plan is required prior to start of construction activities not including mobilization work. Owner's acceptance of the plan will be conditional and predicated on continuing satisfactory adherence to the plan. Owner reserves the right to require Contractor to make changes to the plan and operations, including removal of personnel, as necessary, to obtain specified quality of work results.
- D. Quality-Control Personnel Qualifications. Engage a person with requisite training and experience to implement and manage quality assurance (QA) and quality control (QC) for the project.

#### 1.09 REFERENCES AND STANDARDS

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Obtain copies of standards where required by product specification sections.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

- E. Should specified reference standards conflict with Contract Documents, request clarification from MBI Companies before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of MBI Companies shall be altered from Contract Documents by mention or inference otherwise in any reference document.

#### 1.10 TESTING AND INSPECTION AGENCIES AND SERVICES

- A. Owner will employ services of an independent testing agency to perform certain specified testing; payment for cost of services will be derived from allowance specified in Section 01 21 00; see Section 01 21 00 and applicable sections for description of services included in allowance.
- B. Owner will employ and pay for services of an independent testing agency to perform other specified testing.
- C. Contractor shall employ and pay for services of an independent testing agency to perform other specified testing.
- D. As indicated in individual specification sections, Owner or Contractor shall employ and pay for services of an independent testing agency to perform other specified testing.
- E. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- F. Contractor Employed Agency:
  - 1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM E699, ASTM C1021, ASTM C1077, ASTM C1093, and ASTM D3740.
  - 2. Inspection agency: Comply with requirements of ASTM D3740, and ASTM E329.
  - 3. Laboratory Qualifications: Accredited by IAS according to IAS AC89.
  - 4. Laboratory: Authorized to operate in the State in which the Project is located.
  - 5. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
  - 6. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

#### PART 2 PRODUCTS - NOT USED

#### PART 3 EXECUTION

##### 3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from MBI Companies before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

##### 3.02 MOCK-UPS

- A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements,

using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.

- B. Accepted mock-ups establish the standard of quality the MBI Companies will use to judge the Work.
- C. Integrated Exterior Mock-ups: Construct integrated exterior mock-up as indicated on drawings. Coordinate installation of exterior envelope materials and products as required in individual Specification Sections. Provide adequate supporting structure for mock-up materials as necessary.
- D. Room Mock-ups: Construct room mock-ups as indicated on drawings. Coordinate installation of materials, products, and assemblies as required in specification sections; finish according to requirements. Provide required lighting and any supplemental lighting where required to enable MBI Companies to evaluate quality of the mock-up.
- E. Notify MBI Companies fifteen (15) working days in advance of dates and times when mock-ups will be constructed.
- F. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.
- G. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.
- H. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- I. Obtain MBI Companies' approval of mock-ups before starting work, fabrication, or construction.
  - 1. MBI Companies will issue written comments within seven (7) working days of initial review and each subsequent follow up review of each mock-up.
  - 2. Make corrections as necessary until Architect's approval is issued.
- J. MBI Companies will use accepted mock-ups as a comparison standard for the remaining Work.
- K. Where mock-up has been accepted by MBI Companies and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by MBI Companies.
- L. Legally salvage and recycle the demolished mock-up materials.

### 3.03 TOLERANCES

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

### 3.04 TESTING AND INSPECTION

- A. See individual specification sections for testing and inspection required.
- B. Testing Agency Duties:
  - 1. Test samples of mixes submitted by Contractor.
  - 2. Provide qualified personnel at site. Cooperate with MBI Companies and Contractor in performance of services.
  - 3. Perform specified sampling and testing of products in accordance with specified standards.
  - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  - 5. Promptly notify MBI Companies and Contractor of observed irregularities or non-compliance of Work or products.
  - 6. Perform additional tests and inspections required by MBI Companies.

7. Attend preconstruction meetings and progress meetings.
  8. Submit reports of all tests/inspections specified.
- C. Limits on Testing/Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  2. Agency may not approve or accept any portion of the Work.
  3. Agency may not assume any duties of Contractor.
  4. Agency has no authority to stop the Work.
- D. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
  2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
  3. Provide incidental labor and facilities:
    - a. To provide access to Work to be tested/inspected.
    - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
    - c. To facilitate tests/inspections.
    - d. To provide storage and curing of test samples.
  4. Notify MBI Companies and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
  5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
  6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by MBI Companies.
- F. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.
- 3.05 MANUFACTURERS' FIELD SERVICES
- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment, as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to MBI Companies 30 days in advance of required observations.
1. Observer subject to approval of MBI Companies.
  2. Observer subject to approval of Owner.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- 3.06 DEFECT ASSESSMENT
- A. Replace Work or portions of the Work not complying with specified requirements.
- B. If, in the opinion of MBI Companies, it is not practical to remove and replace the work, MBI Companies will direct an appropriate remedy or adjust payment.

END OF SECTION



PART 1 GENERAL

1.01 SUMMARY

- A. Where codes and standards are referenced in this and other sections of the specifications or on the drawings, whether or not a particular edition is referenced, it is the intention that these be the latest editions as adopted by the governing agency under whose jurisdiction the project is to be constructed. The latest edition shall be the edition in effect on the date approval is granted for construction to begin.

1.02 CODES

- A. Work shall conform to the requirements of the building code indicated on the drawings. If no code is listed, work shall conform to the requirements of the building code in effect for the jurisdiction having authority.
- B. Work shall conform to the requirements of the life safety code indicated on the drawings. If no code is listed, work shall conform to the requirements of the life safety code in effect for the jurisdiction having authority.
- C. Plumbing and gas piping work shall conform to the requirements of the plumbing code indicated on the drawings. If no code is listed, work shall conform to the requirements of the plumbing and gas codes in effect for the jurisdiction having authority.
- D. Work shall conform to the requirements of the electrical code indicated on the drawings. If no code is listed, work shall conform to the requirements of the electrical code in effect for the jurisdiction having authority.
- E. Work shall conform to the requirements of the latest edition of ICC/ANSI A117.1 Standard on Accessible and Usable Buildings and Facilities.
- F. Work shall conform to the requirements of the latest edition of Americans with Disabilities Act (ADA).

1.03 CODE STANDARDS

- A. Fire doors shall conform to requirements of NFPA No. 80, Standards for Fire Doors and Other Opening Protectives.
- B. Heating, ventilating and air conditioning work shall conform to requirements of NFPA No. 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems.

1.04 REGULATIONS

- A. Electrical work shall conform to applicable regulations of the State, Department of Insurance, Division of Fire Prevention and to applicable regulations of the Local Utility Company.
- B. Work shall be performed in a manner approved by the Occupational Safety and Health Administration. The Contractor shall be responsible for job-site safety and training of workman as required by Occupational Safety and Health Administration.
- C. Contractors performing work in schools constructed before 1978 or in any facilities where children under the age of 6 are present shall be certified and shall follow work practices to prevent lead contamination as mandated by the Environmental Protection Agency.

1.05 PERSONNEL BACKGROUND CHECKS

- A. Contractor shall comply with Public Chapter 587 of 2007, as codified in Tennessee Code Annotated Section 49-5-413 and amended in Public Chapter 1080, which requires all contractors to facilitate a criminal history records check conducted by the Tennessee Bureau of Investigation and the Federal Bureau

of Investigation for each employee prior to permitting the employee to have contact with students or enter school grounds when students are present.

1.06 MATERIAL AND TESTING STANDARDS

- A. Components of the work shall conform to requirements of American Society for Testing and Materials (ASTM) Standards, American National Standards Institute (ANSI) standards, and Trade Association Standards, as listed in the various other sections of the specifications.

1.07 MANUFACTURER'S RECOMMENDATIONS

- A. When work in accordance with manufacturer's recommendations is specified, a copy of those recommendations shall be kept in the job office.

1.08 STORM WATER DISCHARGE PERMIT

- A. If Construction Operations will disturb the ground, the Contractor must file a Notice of Intent for and obtain a National Pollutant Discharge Elimination System Permit from:

Tennessee Department of Environment & Conservation  
Division of Water Resources  
William R. Snodgrass Tennessee Tower  
312 Rosa Parks Avenue, 11<sup>th</sup> Floor  
Nashville, TN 37243

- B. Any fines levied because of the Contractor's failure to obtain the necessary permit will be the responsibility of the Contractor.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

PART 1 GENERAL

1.01 Quality Control is defined as testing and inspection performed by/or under the direction of the Contractor to ensure materials and construction meet the requirements of the Contract Documents and Specifications.

1.02 TESTS

A. Engage inspection and test service agencies, including independent testing laboratories, which comply with "Guidelines for Effective Practice for Materials Engineering Laboratories" by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.

B. Tests required to establish compliance with the Contract requirements for quality control shall be made by a testing agency acceptable to the Contractor, the Owner, and the Architect with reports certified by the laboratory and furnished in duplicate to the Architect with a copy to the Contractor.

C. Representatives of the testing agency and monitoring shall have access to the work at all times. The Contractor shall provide facilities for such access and samples as necessary so that the testing agency may properly perform its function.

D. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to the following:

Name of testing agency or testing laboratory.

Dates and locations of samples and test or inspections.

Names of individuals making the inspection or test.

Complete inspection or test data.

Test results

Interpretations of test results.

Notation of significant ambient conditions at the time of sample taking and testing.

Comments or professional opinion as to whether inspected or tested work complies with requirements of the contract documents.

Recommendations on retesting, if applicable.

E. Non-Compliant Inspection/Test Results: Within 24 hours of inspection/test being performed, notify Architect/Engineer-of-Record, and the Contractor of any non-conforming/non-compliant inspections/tests. Copies of successful retests of the originally non-conforming/non-compliant work shall be submitted to the Architect/Engineer-Of-Record and the Contractor.

F. Project Closeout: Contractor shall certify to the Architect of Record that the required quality control services, as required by this section and the contract documents have been performed and that all results indicate compliance with requirements.

1.03 COST OF TESTS

A. The cost of the services of the testing agency and monitoring shall be paid by the Contractor. When the tests indicate noncompliance with the Contract requirements, any subsequent retesting occasioned by noncompliance shall be performed by the same testing agency and the costs shall be paid by the Contractor.

1.04 NOTIFICATIONS OF THE ARCHITECT

A. Notify architect within 24 hours before any work is completed for areas as described herein. If the architect is not notified as stated above and the Contractor proceeds with the work, the Architect shall have authority to direct the Contractor to remove part or all installed materials at the Contractor's expense for a detailed observation.

B. The Architect shall be notified at the following points of work:

1. Footing bottoms and concrete reinforcement prior to pouring any concrete.

2. Waterproofing/Damp-proofing prior to any backfilling work.
  3. Water drainage test on sloped concrete floors prior to finish floor materials installed.
  4. Thru-wall flashing installation and mortar mix prior to installing any masonry.
  5. Completed structural steel erection before floor slabs are poured.
  6. Mechanical and Electrical systems above ceiling inspection prior to installation of finish ceiling material.
- C. The respective contractor and/or subcontractor shall correct any deficiencies that may be observed. Construction work observations or lack thereof by the architect does not relieve the contractor and/or subcontractor from any liability of faulty workmanship that may have occurred or may occur at a later date.

1.05 OTHER TESTS

- A. See provisions of the General Conditions regarding tests required by governing authorities.
- B. The provisions of Divisions 22, 23 and 26 for tests required for plumbing, mechanical, and electrical work.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 REPAIR AND PROTECTION

- A. Upon completion of inspection, testing, sample taking, and similar services, repair damaged work and restore substrates and finishes to eliminate all deficiencies. Repair and protection are the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Code-required special inspections.
- B. Testing services incidental to special inspections.
- C. Submittals.
- D. Manufacturers' field services.
- E. Fabricators' field services.

1.02 RELATED REQUIREMENTS

- A. Document 00 72 00 - General Conditions: Inspections and approvals required by public authorities.
- B. Section 01 21 00 - Allowances: Allowance for payment of testing services.
- C. Section 01 30 00 - Administrative Requirements: Submittal procedures.
- D. Section 01 40 00 - Quality Requirements.
- E. Section 01 41 00 – Regulatory Requirements.
- F. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1.03 ABBREVIATIONS AND ACRONYMS

- A. AHJ: Authority having jurisdiction.
- B. IAS: International Accreditation Service, Inc.
- C. NIST: National Institute of Standards and Technology.

1.04 DEFINITIONS

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

1.05 REFERENCE STANDARDS

- A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary.
- B. AISC 341 - Seismic Provisions for Structural Steel Buildings.
- C. AISC 360 - Specification for Structural Steel Buildings.
- D. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

- F. ASTM A706/A706M - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.
- G. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
- H. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete.
- I. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- J. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
- K. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing.
- L. ASTM E605/E605M - Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.
- M. ASTM E736/E736M - Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.
- N. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestops.
- O. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.
- P. ASTM E2570/E2570M - Standard Test Methods for Evaluating Water-Resistive Barrier (WRB) Coatings Used under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage.
- Q. AWCI 117 - Technical Manual 12-B; Standard Practice for the Testing and Inspection of Field Applied Thin Film Intumescent Fire-Resistive Materials; an Annotated Guide.
- R. AWS D1.1/D1.1M - Structural Welding Code – Steel.
- S. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel.
- T. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel.
- U. ICC (IBC) – International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- V. SDI (QA/QC) – Standard for Quality Control and Quality Assurance for Installation of Steel Deck.
- W. SJI 100 - Catalog of Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders.
- X. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures.

1.06 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency is required to:
  - 1. Submit agency name, address, and telephone number, names of full time registered Engineer and responsible officer.
  - 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
  - 3. Submit certification that Special Inspection Agency is acceptable to AHJ.
- C. Testing Agency Qualifications: Prior to the start of work, the Testing Agency is required to:

1. Submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
  2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
  3. Submit certification that Testing Agency is acceptable to AHJ.
- D. Smoke Control Testing Agency Qualifications: Prior to the start of work, the Testing Agency is required to:
1. Submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
  2. Submit documentary evidence that agency has appropriate credentials and documented experience in fire protection engineering, mechanical engineering and HVAC air balancing.
  3. Submit certification that Testing Agency is acceptable to AHJ.
- E. Manufacturer's Qualification Statement: Manufacturer is required to submit documentation of manufacturing capability and quality control procedures. Include documentation of AHJ approval.
- F. Fabricator's Qualification Statement: Fabricator is required to submit documentation of fabrication facilities and methods as well as quality control procedures. Include documentation of AHJ approval.
- G. Special Inspection Reports: After each special inspection, Special Inspector is required to promptly submit at least two copies of report; one to MBI Companies and one to the AHJ.
1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of Special Inspector.
    - d. Date and time of special inspection.
    - e. Identification of product and specifications section.
    - f. Location in the Project.
    - g. Type of special inspection.
    - h. Date of special inspection.
    - i. Results of special inspection.
    - j. Compliance with Contract Documents.
  2. Final Special Inspection Report: Document special inspections and correction of discrepancies prior to the start of the work.
- H. Fabricator Special Inspection Reports: After each special inspection of fabricated items at the Fabricator's facility, Special Inspector is required to promptly submit at least two copies of report; one to MBI Companies and one to AHJ.
1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of Special Inspector.
    - d. Date and time of special inspection.
    - e. Identification of fabricated item and specification section.
    - f. Location in the Project.
    - g. Results of special inspection.
    - h. Verification of fabrication and quality control procedures.
    - i. Compliance with Contract Documents.
    - j. Compliance with referenced standard(s).
- I. Test Reports: After each test or inspection, promptly submit at least two copies of report; one to MBI Companies and one to AHJ.
1. Include:
    - a. Date issued.

- b. Project title and number.
  - c. Name of inspector.
  - d. Date and time of sampling or inspection.
  - e. Identification of product and specifications section.
  - f. Location in the Project.
  - g. Type of test or inspection.
  - h. Date of test or inspection.
  - i. Results of test or inspection.
  - j. Compliance with Contract Documents.
- J. Certificates: When specified in individual special inspection requirements, Special Inspector shall submit certification by the manufacturer, fabricator, and installation subcontractor to MBI Companies and AHJ, in quantities specified for Product Data.
  - 1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
  - 2. Certificates may be recent or previous test results on material or product, but must be acceptable to MBI Companies and AHJ.
- K. Manufacturer's Field Reports: Submit reports to MBI Companies and AHJ.
  - 1. Submit report in duplicate within 30 days of observation to MBI Companies for information.
  - 2. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in Contract Documents.
- L. Fabricator's Field Reports: Submit reports to MBI Companies and AHJ.
  - 1. Submit report in duplicate within 30 days of observation to MBI Companies for information.
  - 2. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in Contract Documents.

1.07 SPECIAL INSPECTION AGENCY

- A. Owner or Owner's Agent will employ services of a Special Inspection Agency to perform inspections and associated testing and sampling in accordance with ASTM E329 and required by the building code.
- B. The Special Inspection Agency may employ and pay for services of an independent testing agency to perform testing and sampling associated with special inspections and required by the building code.
- C. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.08 TESTING AND INSPECTION AGENCIES

- A. Owner or Owner's Agent may employ services of an independent testing agency to perform additional testing and sampling associated with special inspections but not required by the building code.
- B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.09 QUALITY ASSURANCE

- A. Special Inspection Agency Qualifications:
  - 1. Independent firm specializing in performing testing and inspections of the type specified in this section.
- B. Testing Agency Qualifications:
  - 1. Independent firm specializing in performing testing and inspections of the type specified in this section.
- C. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SCHEDULE OF SPECIAL INSPECTIONS, GENERAL

- A. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.
  - 1. Continuous Special Inspection: Special Inspection Agency is required to be present in the area where the work is being performed and observe the work at all times the work is in progress.
  - 2. Periodic Special Inspection: Special Inspection Agency is required to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

**THE FOLLOWING INFORMATION IS PROVIDED AS A SUPPLEMENT (BUT NOT AN EXHAUSTIVE LIST) TO THE SPECIAL INSPECTION REQUIREMENTS LISTED IN THE DRAWINGS. SPECIAL INSPECTIONS REQUIRED FOR THIS PROJECT ARE LISTED IN THE DRAWINGS AND INFORMATION BELOW IS TO BE USED TO SUPPLEMENT ITEMS THAT ARE REQUIRED.**

3.02 SPECIAL INSPECTIONS FOR STEEL CONSTRUCTION

- A. Structural Steel: Comply with quality assurance inspection requirements of ICC (IBC).
- B. Cold-Formed Steel Deck: Comply with quality assurance inspection requirements of SDI (QA/QC).
- C. Open-Web Joists and Joist Girders: Comply with requirements of ICC (IBC), Table 1705.2.3.
  - 1. End Connections - Welding or Bolted: Comply with requirements of SJI 100; periodic.
  - 2. Bridging - Horizontal or Diagonal:
    - a. Standard Bridging: Comply with requirements of SJI 100; periodic.
    - b. Bridging That Differs From the SJI Specifications: Periodic inspection.

3.03 SPECIAL INSPECTIONS FOR CONCRETE CONSTRUCTION

- A. Reinforcement, Including Prestressing Tendons, and Verification of Placement: Verify compliance with ACI 318, Chapters 20, 25.2, 25.3, 26.6.1-26.6.3; periodic.
- B. Reinforcing Steel, Including Prestressing of Tendons and Placement: Verify compliance with approved Contract Documents and ACI 318, Sections 3.5 and 7.1 through 7.7; periodic.
- C. Reinforcing Bar Welding: Verify compliance with AWS D1.4/D1.4M and ACI 318, 26.6.4; periodic.
  - 1. Verify weldability of reinforcing bars other than those complying with ASTM A706/A706M; periodic.
  - 2. Inspect single-pass fillet welds, maximum 5/16 inch; periodic.
  - 3. Inspect all other welds; continuous.
- D. Anchors Cast in Concrete: Verify compliance with ACI 318, 17.8.2; periodic.
- E. Bolts Installed in Concrete: Where allowable loads have been increased or where strength design is used, verify compliance with approved Contract Documents and ACI 318, Sections 8.1.3 and 21.2.8 prior to and during placement of concrete; continuous.
- F. Anchors Post-Installed in Hardened Concrete: Verify compliance with ACI 318.
  - 1. Adhesive Anchors: Verify horizontally or upwardly-inclined orientation installations resisting sustained tension loads - Section 17.8.2.4; continuous.
  - 2. Other Mechanical and Adhesive Anchors: Verify as per Chapter 17.8.2; periodic.
- G. Design Mix: Verify plastic concrete complies with the design mix in approved Contract Documents and with ACI 318, Chapter 19, 16.4.3, 26.4.4; periodic.
- H. Design Mix: Verify plastic concrete complies with the design mix in approved Contract Documents and with ACI 318, Chapter 4 and 5.2; periodic.

- I. Concrete Sampling Concurrent with Strength Test Sampling: Each time fresh concrete is sampled for strength tests, verify compliance with ASTM C172/C172M, ASTM C31/C31M and ACI 318, Chapter 26.5, 26.12, and record the following, continuous:
  - 1. Slump.
  - 2. Air content.
  - 3. Temperature of concrete.
- J. Concrete and Shotcrete Placement: Verify application techniques comply with approved Contract Documents and ACI 318, Chapter 26.5; continuous.
- K. Specified Curing Temperature and Techniques: Verify compliance with ACI 318, Chapter 26.5.3-26.5.5; periodic.
- L. Specified Curing Temperature and Techniques: Verify compliance with approved Contract Documents and ACI 318, Sections 5.11 through 5.13; periodic.
- M. Concrete Strength in Situ: Verify concrete strength complies with approved Contract Documents and ACI 318, Chapter 26.11.2, for the following:
  - 1. Post-tensioned concrete, prior to stressing of tendons; periodic.
  - 2. Beams and structural slabs, prior to removal of shores and forms; periodic.
- N. Formwork Shape, Location and Dimensions: Verify compliance with approved Contract Documents and ACI 318, Chapter 26.11.1.2(b); periodic.
- O. Welding of Reinforcing Bars: Conduct special inspections and verify Special Inspector's qualifications in accordance with requirements of AWS D1.4/D1.4M.
- P. Materials: If the Contractor cannot provide sufficient data or documentary evidence that concrete materials comply with the quality standards of ACI 318, the AHJ will require testing of materials in accordance with the appropriate standards and criteria in ACI 318, Chapters 19 and 20.

3.04 SPECIAL INSPECTIONS FOR MASONRY CONSTRUCTION

- A. Masonry Structures Subject to Special Inspection:
  - 1. Masonry construction when required by the quality assurance program of TMS 402/602.
  - 2. Empirically designed masonry, glass unit masonry and masonry veneer in structures designated as "essential facilities".
    - a. Perform inspections in accordance with Level B Quality Assurance.
  - 3. Engineered masonry in structures classified as "low hazard..." and "substantial hazard to human life in the event of failure".
- B. Verify each item below complies with approved Contract Documents and the applicable articles of TMS 402/602.
  - 1. Inspections and Approvals:
    - a. Verify compliance with the required inspection provisions of the approved Contract Documents; periodic.
    - b. Verify approval of submittals required by Contract Documents; periodic.
  - 2. Compressive Strength of Masonry: Verify compressive strength of masonry units prior to start of construction unless specifically exempted by code; periodic.
  - 3. Slump Flow and Visual Stability Index (VSI): Verify compliance as self consolidating grout arrives on site; continuous.
  - 4. Joints and Accessories: When masonry construction begins, verify:
    - a. Proportions of site prepared mortar; periodic.
    - b. Construction of mortar joints; periodic.
    - c. Location of reinforcement, connectors, prestressing tendons, anchorages, etc; periodic.
    - d. Prestressing technique; periodic.
    - e. Grade and size of prestressing tendons and anchorages; periodic.
  - 5. Structural Elements, Joints, Anchors, Protection: During masonry construction, verify:

- a. Size and location of structural elements; periodic.
- b. Type, size and location of anchors, including anchorage of masonry to structural members, frames or other construction; periodic.
- c. Size, grade and type of reinforcement, anchor bolts and prestressing tendons and anchorages; periodic.
- d. Welding of reinforcing bars; continuous.
- e. Preparation, construction and protection of masonry against hot weather above 90 degrees F and cold weather below 40 degrees F; periodic.
- f. Application and measurement of prestressing force; continuous.
6. Grouting Preparation: Prior to grouting, verify:
  - a. Grout space is clean; periodic.
  - b. Correct placement of reinforcing, connectors, prestressing tendons and anchorages; periodic.
  - c. Correctly proportioned site prepared grouts and prestressing grout for bonded tendons; periodic.
  - d. Correctly constructed mortar joints; periodic.
7. Prestressing Bonded Tendons: Verify placement after grouting; continuous.
8. Preparation of Grout Specimens, Mortar Specimens and Prisms: Observe preparation of specimens; periodic.

### 3.05 SPECIAL INSPECTIONS FOR SOILS

- A. Materials and Placement: Verify each item below complies with approved construction documents and approved geotechnical report.
  1. Design bearing capacity of material below shallow foundations; periodic.
  2. Design depth of excavations and suitability of material at bottom of excavations; periodic.
  3. Materials, densities, lift thicknesses; placement and compaction of backfill: continuous.
  4. Subgrade, prior to placement of compacted fill verify proper preparation; periodic.
- B. Testing: Classify and test excavated material; periodic.

### 3.06 SPECIAL INSPECTIONS FOR VERTICAL MASONRY FOUNDATION ELEMENTS

- A. Vertical Masonry Foundation Elements are subject to the same special inspection requirements listed in the "Special Inspections for Masonry Construction" Article of this section.

### 3.07 SPECIAL INSPECTIONS FOR SPRAYED FIRE RESISTANT MATERIALS

- A. Sprayed Fire Resistant Materials, General:
  1. Verify compliance of sprayed-fire resistant materials with specific fire-rated assemblies indicated in approved Contract Documents, and with applicable requirements of the building code.
  2. Perform special inspections after rough installation of electrical, mechanical, plumbing, automatic fire sprinkler and suspension systems for ceilings.
- B. Physical and visual tests: Verify compliance with fire resistance rating.
  1. Condition of substrates; periodic.
  2. Thickness of sprayed fire resistant material; periodic.
  3. Density of sprayed fire resistant material in pounds per cubic foot; periodic.
  4. Bond strength (adhesion and cohesion); periodic.
  5. Condition of finished application; periodic.
- C. Structural member surface conditions:
  1. Inspect structural member surfaces before application of sprayed fire resistant materials; periodic.
  2. Verify preparation of structural member surfaces complies with approved Contract Documents and manufacturer's written instructions; periodic.
- D. Application:
  1. Ensure minimum ambient temperature before and after application complies with the manufacturer's written instructions; periodic.

2. Verify area where sprayed fire resistant material is applied is ventilated as required by the manufacturer's written instructions during and after application; periodic.
  - E. Thickness: Verify that no more than 10 percent of thickness measurements taken from sprayed fire resistant material are less than thickness required by fire resistance design in approved Contract Documents. In no case shall the thickness of the sprayed fire resistant material be less than the minimum below.
    1. Minimum Allowable Thickness: Tested according to ASTM E605/E605M, periodic.
      - a. Design thickness 1 inch or greater: Design thickness minus 1/4 inch.
      - b. Design thickness greater than 1 inch: Design thickness minus 25 percent.
    2. Floor, Roof and Wall Assemblies: Test thickness according to ASTM E605/E605M with no less than four measurements per 1,000 square feet of sprayed area on each story of the structure or portion thereof; periodic.
      - a. Cellular Decks: Measure thickness within a single 12 inch by 12 inch area. Make a minimum of four measurements arranged symmetrically in testing area.
      - b. Fluted Decks: Measure thickness within a single 12 inch by 12 inch area. Make a minimum of four measurements arranged symmetrically in testing area and include one example each of valley, crest and sides. Report the average of the four measurements.
    3. Structural Members: Test according to ASTM E605/E605M. Test no less than 25 percent of structural members on each story of the structure or portion thereof; periodic.
      - a. Beams and girders: Make nine thickness measurements around beam or girder at each end of a 12 inch by 12 inch length.
      - b. Joists and trusses: Make seven thickness measurements around joist or truss at each end of a 12 inch by 12 inch length.
      - c. Wide flanged columns: Make twelve thickness measurements around column at each end of a 12 inch by 12 inch length.
      - d. Hollow structural sections and pipe columns: Make four thickness measurements around hollow structural section or pipe column at each end of a 12 inch by 12 inch length.
  - F. Density: Verify density of sprayed fire resistant material is no less than density required by the fire resistance design in the approved Contract Documents.
    1. Floor, Roof and Wall Assemblies: Test according to ASTM E605/E605M with no less than one sample per 2,500 square feet of sprayed area on each story of the structure or portion thereof; periodic.
    2. Beams, Girders, Trusses and Columns: Test according to ASTM E605/E605M with no less than one sample per 2,500 square feet of sprayed area on each story of the structure or portion thereof; periodic.
  - G. Bond Strength: Verify adhesive and cohesive bond strength of sprayed fire resistant materials is no less than 150 pounds per square foot when in-place samples of the cured material are tested according to ASTM E736/E736M and as described below.
    1. Floor, roof and wall assemblies: Test no less than one sample per each 2,500 square feet of sprayed area on each story of the structure or portion thereof; periodic.
    2. Structural members: Test no less than one sample from each type of structural member in each 2,500 square feet of each story of the structure or portion thereof; periodic.
    3. Primer, paint and encapsulant bond tests: When sprayed fire resistant material is applied to a primed, painted or encapsulated surface for which acceptable material to substrate performance has not been determined, conduct bond test.
- 3.08 SPECIAL INSPECTIONS FOR MASTIC AND INTUMESCENT FIRE RESISTANT COATINGS
- A. Verify mastic and intumescent fire resistant coatings comply with AWCI 117 and the fire resistance rating indicated on approved Contract Documents.
- 3.09 SPECIAL INSPECTIONS FOR EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS)
- A. Verify water resistive barrier coating applied over sheathing complies with ASTM E2570/E2570M.
- 3.10 SPECIAL INSPECTIONS FOR FIRE RESISTANT PENETRATIONS AND JOINTS
- A. Verify penetration firestops in accordance with ASTM E2174.

- B. Verify fire resistant joints in accordance with ASTM E2393.

### 3.11 SPECIAL INSPECTIONS FOR SMOKE CONTROL

- A. Test smoke control systems as follows:
  - 1. Record device locations and test system for leakage after erection of ductwork but before starting construction that conceals or blocks access to system.
  - 2. Test and record pressure difference, flow measurements, detection function and controls after system is complete and before structure is occupied.

### 3.12 OTHER SPECIAL INSPECTIONS

- A. Provide for special inspection of work that, in the opinion of the AHJ, is unusual in nature.
- B. For the purposes of this section, work unusual in nature includes, but is not limited to:
  - 1. Construction materials and systems that are alternatives to materials and systems prescribed by the building code.
  - 2. Unusual design applications of materials described in the building code.
  - 3. Materials and systems required to be installed in accordance with the manufacturer's instructions when said instructions prescribe requirements not included in the building code or in standards referenced by the building code.
- C. Alternative Test Procedures: Where approved rules and standards do not exist, test materials and assemblies as required by AHJ or provide AHJ with documentation of quality and manner in which those materials and assemblies are used.
- D. Load Tests:
  - 1. Proposed Construction and Construction in Progress: Where required by code, conduct tests listed below.
    - a. Load test procedures specified in code; periodic.
    - b. Load test procedures not specified in code; periodic.
    - c. Loadbearing Wall and Partition Assemblies: Load test with and without window framing; periodic.
    - d. Exterior Window and Door Assemblies: Wind load design pressure test; periodic.
  - 2. Completed Construction: Where required by code, conduct tests listed below.
    - a. Load test procedures specified in code; periodic.
    - b. Load test procedures not specified in code; periodic.

### 3.13 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES

- A. Special Inspection Agency shall:
  - 1. Verify samples submitted by Contractor comply with the referenced standards and the approved Contract Documents.
  - 2. Provide qualified personnel at site. Cooperate with MBI Companies and Contractor in performance of services.
  - 3. Perform specified sampling and testing of products in accordance with specified reference standards.
  - 4. Ascertain compliance of materials and products with requirements of Contract Documents.
  - 5. Promptly notify MBI Companies and Contractor of observed irregularities or non-compliance of work or products.
  - 6. Perform additional tests and inspections required by MBI Companies.
  - 7. Attend preconstruction meetings and progress meetings.
  - 8. Submit reports of all tests or inspections specified.
- B. Limits on Special Inspection Agency Authority:
  - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  - 2. Agency may not approve or accept any portion of the work.
  - 3. Agency may not assume any duties of Contractor.
  - 4. Agency has no authority to stop the work.

- C. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by MBI Companies.
- D. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

### 3.14 TESTING AGENCY DUTIES AND RESPONSIBILITIES

- A. Testing Agency Duties:
  - 1. Test samples submitted by Contractor.
  - 2. Provide qualified personnel at site. Cooperate with MBI Companies and Contractor in performance of services.
  - 3. Perform specified sampling and testing of products in accordance with specified standards.
  - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  - 5. Promptly notify MBI Companies and Contractor of observed irregularities or non-compliance of work or products.
  - 6. Perform additional tests and inspections required by MBI Companies.
  - 7. Attend preconstruction meetings and progress meetings.
  - 8. Submit reports of all tests or inspections specified.
- B. Limits on Testing or Inspection Agency Authority:
  - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  - 2. Agency may not approve or accept any portion of the work.
  - 3. Agency may not assume any duties of Contractor.
  - 4. Agency has no authority to stop the work.
- C. On instructions by MBI Companies, perform re-testing required because of non-compliance with specified requirements, using the same agency.
- D. Contractor will pay for re-testing required because of non-compliance with specified requirements.

### 3.15 CONTRACTOR DUTIES AND RESPONSIBILITIES

- A. Contractor Responsibilities, General:
  - 1. Deliver to agency at designated location, adequate samples of materials for special inspections that require material verification.
  - 2. Cooperate with agency and laboratory personnel; provide access to approved documents at project site, to the work, to manufacturers' facilities, and to fabricators' facilities.
  - 3. Provide incidental labor and facilities:
    - a. To provide access to work to be tested or inspected.
    - b. To obtain and handle samples at the site or at source of Products to be tested or inspected.
    - c. To facilitate tests or inspections.
    - d. To provide storage and curing of test samples.
  - 4. Notify MBI Companies and laboratory 24 hours prior to expected time for operations requiring testing or inspection services.
  - 5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
  - 6. Retain special inspection records.
- B. Contractor Responsibilities, Seismic Force-Resisting System, Designated Seismic System, and Seismic Force-Resisting Component: Submit written statement of responsibility for each item listed in the Statement of Special Inspections to AHJ and Owner prior to starting work. Statement of responsibility shall acknowledge awareness of special construction requirements and other requirements listed.
- C. Contractor Responsibilities, Wind Force-Resisting System and Wind Force-Resisting Component: Submit written statement of responsibility for each item listed in the Statement of Special Inspections to AHJ and Owner prior to starting work. Statement of responsibility shall acknowledge awareness of special construction requirements and other requirements listed.

3.16 MANUFACTURERS' AND FABRICATORS' FIELD SERVICES

- A. When specified in individual specification sections, require material suppliers, assembly fabricators, or product manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, to test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to MBI Companies 30 days in advance of required observations.
  - 1. Observer subject to approval of MBI Companies.
  - 2. Observer subject to approval of Owner.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Dewatering
- B. Temporary utilities.
- C. Temporary telecommunications services.
- D. Temporary sanitary facilities.
- E. Temporary Controls: Barriers, enclosures, and fencing.
- F. Security requirements.
- G. Vehicular access and parking.
- H. Waste removal facilities and services.
- I. Project identification sign.
- J. Field offices.

1.02 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

1.03 DEWATERING

- A. Provide temporary means and methods for dewatering all temporary facilities and controls.
- B. Maintain temporary facilities in operable condition.

1.04 TEMPORARY UTILITIES

- A. Owner will provide the following:
  - 1. Electrical power and metering, consisting of connection to existing facilities.
  - 2. Water supply, consisting of connection to existing facilities.
- B. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.
- C. Existing facilities may not be used.
- D. New permanent facilities may be used.
- E. Use trigger-operated nozzles for water hoses, to avoid waste of water.

1.05 TELECOMMUNICATIONS SERVICES

- A. Provide equivalent equipment and connections for Owner's field office.
- B. Telecommunications services shall include:
  - 1. Windows-based personal computer dedicated to project telecommunications, with necessary software and laser printer.
  - 2. Telephone Land Lines: One line, minimum; one handset per line.
  - 3. Internet Connections: Minimum of one; DSL modem or faster.
  - 4. Email: Account/address reserved for project use.
  - 5. Facsimile Service: Minimum of one dedicated fax machine/printer, with dedicated phone line.
  - 6. Facsimile Service: Fax-to-email software on personal computer.
  - 7. Project web site.

1.06 TEMPORARY SANITARY FACILITIES

- A. Provide adequate temporary toilet facilities for the use of workmen, conforming to applicable laws, ordinances, and governmental regulations. Service sanitary facilities on a weekly basis. Provide at time of project mobilization.
- B. Maintain daily in clean and sanitary condition.
- C. At end of construction, temporary toilet facilities shall be removed from the site.

1.07 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Provide protection for plants designated to remain. Replace damaged plants.
- D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.08 FENCING

- A. Construction: Commercial grade chain link fence.
- B. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.09 EXTERIOR ENCLOSURES

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

1.10 INTERIOR ENCLOSURES

- A. Provide temporary partitions and ceilings as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.
- B. Construction: Framing and reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces:
  - 1. Insulated to R-19.
  - 2. STC rating of 35 in accordance with ASTM E90.
  - 3. Maximum flame spread rating of 75 in accordance with ASTM E84.
- C. Paint surfaces exposed to view from Owner-occupied areas.

1.11 SECURITY

- A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.
- B. Coordinate with Owner's security program.

1.12 VEHICULAR ACCESS AND PARKING

- A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
- B. Coordinate access and haul routes with governing authorities and Owner.

- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Provide means of removing mud from vehicle wheels before entering streets.
- E. Designated existing on-site roads may be used for construction traffic.
- F. Existing parking areas may be used for construction parking.

1.13 WASTE REMOVAL

- A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- C. Provide containers with lids. Remove trash from site periodically.
- D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.14 PROJECT IDENTIFICATION

- A. On or near the field office, the Contractor shall install a bulletin board upon which to post legally required notices. The bulletin board shall be of adequate size to contain all required notices and be so constructed as to protect the postings from obliteration by the weather.
- B. The Architect shall provide one painted sign stating the Architect (MBI Companies, Inc.). Location of sign shall be as directed by the Architect. The Contractor shall erect a substantial wood frame to support the sign provided by the Architect.
- C. Maintain all bulletin boards and job signs in good condition from start to completion of the work.
- D. No other signs are allowed without Owner permission except those required by law.

1.15 FIELD OFFICES

- A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.
- B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.
- C. Locate offices a minimum distance of 30 feet from existing and new structures.

1.16 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

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

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

- A. Section 01 10 00 - Summary: Lists of products to be removed from existing building, and identification of Owner-supplied products.
- B. Section 01 25 00 - Substitution Procedures: Substitutions made during procurement and/or construction phases.
- C. Section 01 40 00 - Quality Requirements: Product quality monitoring.
- D. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.
- E. Section 01 74 19 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.03 SUBMITTALS

- A. See Section 01 30 00 – Administrative Requirements.

1.04 QUALITY ASSURANCE

- A. Composite Wood and Agrifiber: Products made of wood particles and/or plant material pressed and bonded with adhesive or resin such as particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates, and door cores.
- B. Rapidly Renewable Materials: Made from agricultural products that are typically harvested within a 10-year or shorter cycle.
- C. Recycled Content: Determine percentage of post-consumer and pre-consumer (post-industrial) content separately, using the guidelines contained in 16 CFR 260.13.
  - 1. Previously used, reused, refurbished, and salvaged products are not considered recycled.
  - 2. Wood fabricated from timber abandoned in transit to original mill is considered reused, not recycled.
  - 3. Determine percentage of recycled content of any item by dividing the weight of recycled content in the item by the total weight of materials in the item.
  - 4. Determine value of recycled content of each item separately, by multiplying the content percentage by the value of the item.
  - 5. Acceptable Evidence:
    - a. For percentage of recycled content, information from manufacturer.
    - b. For cost, Contractor's cost data.
- D. Regional Materials: Materials that are extracted, harvested, recovered, and manufactured within a radius of 100 miles from the Project site.

- E. Reused Products: Materials and equipment previously used in this or other construction, salvaged and refurbished as specified.
  - 1. Wood fabricated from timber abandoned in transit after harvesting is considered reused, not recycled.
  - 2. Acceptable Evidence: Information about the origin or source, from Contractor or supplier.
- F. Source Location: Location of harvest, extraction, recovery, or manufacture; where information about source location is required to be submitted, give the postal address:
  - 1. In every case, indicate the location of final assembly.
  - 2. For harvested products, indicate location of harvest.
  - 3. For extracted (i.e. mined) products, indicate location of extraction.
  - 4. For recovered products, indicate location of recovery.
  - 5. For products involving multiple manufacturing steps, provide a description of the process at each step, with location.
  - 6. Acceptable Evidence:
    - a. Manufacturer's certification.
    - b. Life cycle analysis (LCA) performed by third-party.
- G. Sustainably Harvested Wood: Solid wood, wood chips, and wood fiber certified or labeled by an organization accredited by one of the following:
  - 1. American Forest Foundation, The American Tree Farm System; refer to <http://www.treefarmssystem.org>.
  - 2. Canadian Sustainable Forest Management System, under CAN/CSA Z809; refer to <http://www.csasfmforests.ca>.
  - 3. The Forest Stewardship Council, The Principles for Natural Forest Management; for Canada visit <http://www.fsccanada.org>, for the USA visit <http://www.fscus.org>.
  - 4. Sustainable Forestry Board, under The Sustainable Forestry Initiative® of the American Forest & Paper Association; refer to <http://www.afandpa.org>.
  - 5. Acceptable Evidence: Copies of invoices bearing the certifying organization's certification numbers.

## PART 2 PRODUCTS

### 2.01 EXISTING PRODUCTS

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.
- B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.
- C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.
- D. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is required.
  - 1. See Section 01 10 00 for list of items required to be salvaged for reuse and relocation.
  - 2. If reuse of other existing materials or equipment is desired, submit substitution request.

### 2.02 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. See Section 01 40 00 - Quality Requirements, for additional source quality control requirements.
- C. Use of products having any of the following characteristics is not permitted:
  - 1. Made using or containing CFC's or HCFC's.
  - 2. Made of wood from newly cut old growth timber.
  - 3. Containing lead, cadmium, or asbestos.

- D. Where other criteria are met, Contractor shall give preference to products that:
1. If used on interior, have lower emissions, as defined in Section 01 61 16.
  2. If wet-applied, have lower VOC content, as defined in Section 01 61 16.
  3. Are extracted, harvested, and/or manufactured closer to the location of the project.
  4. Have longer documented life span under normal use.
  5. Result in less construction waste. See Section 01 74 19
  6. Are made of vegetable materials that are rapidly renewable.
  7. Are made of recycled materials.
  8. If made of wood, are made of sustainably harvested wood, wood chips, or wood fiber.
  9. If bio-based, other than wood, are or are made of Sustainable Agriculture Network certified products.
- E. Provide interchangeable components of the same manufacture for components being replaced.

#### 2.03 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

#### 2.04 MAINTENANCE MATERIALS

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

### PART 3 EXECUTION

#### 3.01 SUBSTITUTION LIMITATIONS

- A. See Section 01 25 00 - Substitution Procedures.

#### 3.02 OWNER-SUPPLIED PRODUCTS

- A. See Section 01 10 00 - Summary for identification of Owner-supplied products.
- B. Owner's Responsibilities:
1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
  2. Arrange and pay for product delivery to site.
  3. On delivery, inspect products jointly with Contractor.
  4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
  5. Arrange for manufacturers' warranties, inspections, and service.
- C. Contractor's Responsibilities:
1. Review Owner reviewed shop drawings, product data, and samples.
  2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
  3. Handle, store, install and finish products.
  4. Repair or replace items damaged after receipt.

#### 3.03 TRANSPORTATION AND HANDLING

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

### 3.04 STORAGE AND PROTECTION

- A. Provide protection of stored materials and products against theft, casualty, or deterioration.
- B. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 74 19.
  - 1. Structural Loading Limitations: Handle and store products and materials so as not to exceed static and dynamic load-bearing capacities of project floor and roof areas.
- C. Store and protect products in accordance with manufacturers' instructions.
- D. Store with seals and labels intact and legible.
- E. Arrange storage of materials and products to allow for visual inspection for the purpose of determination of quantities, amounts, and unit counts.
- F. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- G. For exterior storage of fabricated products, place on sloped supports above ground.
- H. Provide off-site storage and protection when site does not permit on-site storage or protection.
  - 1. Execute a formal supplemental agreement between Owner and Contractor allowing off-site storage, for each occurrence.
- I. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- J. Comply with manufacturer's warranty conditions, if any.
- K. Do not store products directly on the ground.
- L. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- M. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- N. Prevent contact with material that may cause corrosion, discoloration, or staining.
- O. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- P. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for Indoor-Emissions-Restricted products.
- B. Requirements for VOC-Content-Restricted products.

1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements: Submittal procedures.
- B. Section 01 40 00 - Quality Requirements: Procedures for testing and certifications.
- C. Section 01 60 00 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

1.03 DEFINITIONS

- A. Indoor-Emissions-Restricted Products: All products in the following product categories, whether specified or not:
  - 1. Interior paints and coatings applied on site.
  - 2. Interior adhesives and sealants applied on site, including flooring adhesives.
  - 3. Flooring.
  - 4. Composite wood.
  - 5. Products making up wall and ceiling assemblies.
  - 6. Thermal and acoustical insulation.
- B. VOC-Content-Restricted Products: All products in the following product categories, whether specified or not:
  - 1. Interior paints and coatings applied on site.
  - 2. Interior adhesives and sealants applied on site, including flooring adhesives.
- C. Interior of Building: Anywhere inside the exterior weather barrier.
- D. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.
- E. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.
- F. Inherently Non-Emitting Materials: Products composed wholly of minerals or metals, unless they include organic-based surface coatings, binders, or sealants; and specifically the following:
  - 1. Stone.
  - 2. Concrete.
  - 3. Clay brick.
  - 4. Metals that are plated, anodized, or powder-coated.
  - 5. Glass.
  - 6. Ceramics.
  - 7. Solid wood flooring that is unfinished and untreated.

1.04 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings; 2005 (Reapproved 2013).

- C. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers; 2017, v1.2.
- D. CARB (ATCM) - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products; California Air Resources Board; current edition.
- E. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board; 2007.
- F. CHPS (HPPD) - High Performance Products Database; Current Edition at [www.chps.net/](http://www.chps.net/).
- G. CRI (GLP) - Green Label Plus Testing Program - Certified Products; Current Edition.
- H. SCAQMD 1113 - Architectural Coatings; 1977 (Amended 2016).
- I. SCAQMD 1168 - Adhesive and Sealant Applications; 1989 (Amended 2017).
- J. SCS (CPD) - SCS Certified Products; Current Edition.
- K. UL (GGG) - GREENGUARD Gold Certified Products; Current Edition.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: For each VOC-restricted product used in the project, submit evidence of compliance.

1.06 QUALITY ASSURANCE

- A. Indoor Emissions Standard and Test Method: CAL (CDPH SM), using Standard Private Office exposure scenario and the allowable concentrations specified in the method, and range of total VOC's after 14 days.
  - 1. Wet-Applied Products: State amount applied in mass per surface area.
  - 2. Paints and Coatings: Test tinted products, not just tinting bases.
  - 3. Evidence of Compliance: Acceptable types of evidence are the following;
    - a. Current UL (GGG) certification.
    - b. Current SCS (CPD) Floorscore certification.
    - c. Current SCS (CPD) Indoor Advantage Gold certification.
    - d. Current listing in CHPS (HPPD) as a low-emitting product.
    - e. Current CRI (GLP) certification.
    - f. Test report showing compliance and stating exposure scenario used.
  - 4. Product data submittal showing VOC content is NOT acceptable evidence.
  - 5. Manufacturer's certification without test report by independent agency is NOT acceptable evidence.
- B. VOC Content Test Method: 40 CFR 59, Subpart D (EPA Method 24), or ASTM D3960, unless otherwise indicated.
  - 1. Evidence of Compliance: Acceptable types of evidence are:
    - a. Report of laboratory testing performed in accordance with requirements.
    - b. Published product data showing compliance with requirements.
- C. Composite Wood Emissions Standard: CARB (ATCM) for ultra-low emitting formaldehyde (ULEF) resins.
  - 1. Evidence of Compliance: Acceptable types of evidence are:
    - a. Current SCS "No Added Formaldehyde (NAF)" certification; [www.scs-certified.com](http://www.scs-certified.com).
    - b. Report of laboratory testing performed in accordance with requirements.
    - c. Published product data showing compliance with requirements.
- D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All Products: Comply with the most stringent of federal, State, and local requirements, or these specifications.
- B. VOC-Content-Restricted Products: VOC content not greater than required by the following:
  - 1. Adhesives, Including Flooring Adhesives: SCAQMD 1168 Rule.
  - 2. Joint Sealants: SCAQMD 1168 Rule.
  - 3. Paints and Coatings: Each color; most stringent of the following:
    - a. 40 CFR 59, Subpart D.
    - b. SCAQMD 1113 Rule.
    - c. CARB (SCM).

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.
- B. Additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Surveying for laying out the work.
- F. Cleaning and protection.
- G. Starting of systems and equipment.
- H. Demonstration and instruction of Owner personnel.
- I. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

1.02 RELATED REQUIREMENTS

- A. Section 01 10 00 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
- B. Section 01 30 00 - Administrative Requirements: Submittals procedures, Electronic document submittal service.
- C. Section 01 40 00 - Quality Requirements: Testing and inspection procedures.
- D. Section 01 50 00 - Temporary Facilities and Controls: Temporary exterior enclosures, and temporary interior partitions.
- E. Section 01 74 19 - Construction Waste Management and Disposal: Additional procedures for trash/waste removal, recycling, salvage, and reuse.
- F. Section 02 41 19 – Selective Demolition: Demolition of parts of structures.
- G. Individual Product Specification Sections:
  - 1. Advance notification to other sections of openings required in work of those sections.
  - 2. Limitations on cutting structural members.

1.03 REFERENCE STANDARDS

- A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.

1.04 SUBMITTALS

- A. See Section 01 30 00 – Administrative Requirements.
- B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
  - 1. On request, submit documentation verifying accuracy of survey work.
  - 2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
  - 3. Submit surveys and survey logs for the project record.
- C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
  - 1. Structural integrity of any element of Project.
  - 2. Integrity of weather exposed or moisture resistant element.
  - 3. Efficiency, maintenance, or safety of any operational element.
  - 4. Visual qualities of sight exposed elements.

5. Work of Owner or separate Contractor.
  6. Include in request:
    - a. Identification of Project.
    - b. Location and description of affected work.
    - c. Necessity for cutting or alteration.
    - d. Description of proposed work and products to be used.
    - e. Effect on work of Owner or separate Contractor.
    - f. Written permission of affected separate Contractor.
    - g. Date and time work will be executed.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities.
- 1.05 QUALIFICATIONS
- A. For demolition work, employ a firm specializing in the type of work required.
- B. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to MBI Companies. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities.
- 1.06 PROJECT CONDITIONS
- A. Use of explosives is not permitted.
- B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- C. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- D. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- E. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
  1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
  2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
- F. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
  1. Minimize amount of bare soil exposed at one time.
  2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
  3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
  4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- G. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
  1. At All Times: Excessively noisy tools and operations will not be tolerated inside the building at any time of day; excessively noisy includes jackhammers.
  2. Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.
- H. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
  1. Pest Control Service: Weekly treatments.
- I. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

- J. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

#### 1.07 COORDINATION

- A. See Section 01 10 00 - Summary for occupancy-related requirements.
- B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- C. Notify affected utility companies and comply with their requirements.
- D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and clean-up of work of separate sections.
- G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

### PART 2 PRODUCTS

#### 2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 25 00 – Substitution Procedures, and on 00 63 25 – Substitution Request Form.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

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

#### 3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.

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

### 3.03 PREINSTALLATION MEETINGS

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

### 3.04 LAYING OUT THE WORK

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

### 3.05 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
1. Verify that construction and utility arrangements are as indicated.
  2. Report discrepancies to MBI Companies before disturbing existing installation.
  3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
  2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.
- C. Remove existing work as indicated and as required to accomplish new work.
1. Remove items indicated on drawings.
  2. Relocate items indicated on drawings.
  3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
  4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
  2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
  3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
    - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
    - b. Provide temporary connections as required to maintain existing systems in service.
  4. Verify that abandoned services serve only abandoned facilities.
  5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- E. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
  2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
  3. Repair adjacent construction and finishes damaged during removal work.
- F. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
- G. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- H. Refinish existing surfaces as indicated:
1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
  2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

- I. Clean existing systems and equipment.
- J. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- K. Do not begin new construction in alterations areas before demolition is complete.
- L. Comply with all other applicable requirements of this section.

### 3.07 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
  - 1. Complete the work.
  - 2. Fit products together to integrate with other work.
  - 3. Provide openings for penetration of mechanical, electrical, and other services.
  - 4. Match work that has been cut to adjacent work.
  - 5. Repair areas adjacent to cuts to required condition.
  - 6. Repair new work damaged by subsequent work.
  - 7. Remove samples of installed work for testing when requested.
  - 8. Remove and replace defective and non-complying work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 00 - Firestopping, to full thickness of the penetrated element.
- J. Patching:
  - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
  - 2. Match color, texture, and appearance.
  - 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

### 3.08 PROGRESS CLEANING

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

3.09 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 SYSTEM STARTUP

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.
- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION

- A. Conduct training session for Owner's designated personnel covering various mechanical, electrical, and other operating features for familiarization with the physical plant equipment and operation. One copy of the required (see various technical sections on project closeout) mechanical operations manual shall be on hand during this session along with the mechanics familiar with all equipment. These mechanics shall have on hand such tools and/or equipment to reveal controls and mechanic access areas. The instruction session shall be scheduled for a full day but in no case less than the minimum time required to review each type of equipment/operation. The minimum areas of instruction shall be:
  - 1. Location and operation of project site water valves, meters and other operational equipment.
  - 2. Location and operation of project electrical disconnects.
  - 3. Operation of sewage handling facilities.
  - 4. Sprinkler valves, alarms, test and operation.
  - 5. Project landscape irrigation operation.
  - 6. Project Site lighting operation/maintenance.
  - 7. Storm sewer operation/configuration.
  - 8. Refuse containment areas.
  - 9. Roof maintenance/warranty considerations. Traffic cautions.
  - 10. HVAC unit operations/maintenance (filters and thermostats, boiler and/or cooling tower maintenance).
  - 11. Interior lighting, lamp and ballast replacement.
  - 12. Keying and lock operations.
  - 13. Locations and use of required replacement finish materials such as floor and ceiling tiles and panels.
  - 14. Notification procedures for Contractor warranty work.

- B. Video Tape Owner's Instruction Session and provide two (2) copies on DVD to Owner as part of Close Out Documentation.

3.12 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.13 FINAL CLEANING

- A. Use cleaning materials that are nonhazardous.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- E. Clean filters of operating equipment.
- F. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
- G. Clean site; sweep paved areas, rake clean landscaped surfaces.
- H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.14 SUBSTANTIAL COMPLETION

- A. Notify the owner not less than twenty-one (21) days prior to the date of substantial completion to allow notification of tenants.
- B. Submit written certification to Architect that Project, or designated portion of Project, is substantially complete. Include a list of items to be completed or corrected as a result of his inspection of the work.
- C. Submit the Certificate of Occupancy issued by the local building authority to the Architect for forwarding to the Owner.
- D. The Architect will make an inspection within seven (7) days after receipt of certification, together with Owner's Representative.
- E. Should the Architect consider the work substantially complete:
  - 1. The Contractor shall prepare, and submit to the Architect, a list of items to be completed or corrected, as determined by the Architect's inspection.
  - 2. The Architect will prepare and issue a certificate of substantial completion, AIA document G704, complete with signatures of Owner, Contractor, and Architect, accompanied by Contractor's list of items to be completed or corrected, as verified and amended by the Architect.
  - 3. The Owner will occupy the project, under provisions stated in certificate of substantial completion.
  - 4. The Contractor will complete work listed for completion or correction, within the designated time.
  - 5. Refer to Supplementary Conditions Article 9.10.6 for failure to complete in a timely manner.
- F. Should the Architect consider that the Work is not Substantially Complete:
  - 1. He shall immediately notify Contractor, in writing stating reasons.
  - 2. The Contractor shall complete the Work, and send second written notice to the Architect, certifying that the project or designated portion of project, is substantially complete.
  - 3. The Architect will reinspect the work at the Contractor's expense.

3.15 CLOSEOUT PROCEDURES AT FINAL COMPLETION:

- A. As a precedent to final acceptance of the work and issuance of Certificate of Final Payment, including the Release of Retainage, certain submittals shall be made as specified in the various sections of the specifications. All such submittals shall be delivered to the Architect, in the form and number of copies specified, prior to or with the Contractor's request for final payment. Submittals shall include but not be limited to:
1. General Contractor's Affidavit, Waiver and Release of Lien Statements and Consent of Surety, to final payment as well as release of lien statements from all subcontractors and major material suppliers as specified in Subparagraph 9.10.2 of the General Conditions. These documents shall be addressed to the Owner and shall be original signed documents and not reproduced copies. Two (2) sets of these drawings shall be submitted.
  2. Written guarantees and warranties as specified in the various other sections of the specifications.
  3. Record drawings as specified in the General Conditions. Include electronic files provided to Contractor for use in the project with as-built information added.
  4. One copy of each final approved shop drawing submitted during the course of the project. Include electronic files provided to Contractor for use in the project with as-built information added.
  5. Three copies of operation and maintenance data for mechanical equipment and electrical equipment.
  6. Letter stating that to the best of the Contractor's knowledge, no asbestos containing materials or other Work hazardous materials or products as currently defined in the Resource Conservation and Recovery Act of 1976 (RCRA), the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), or Environmental Protection Agency (EPA) regulations, rules, or requirements, as amended
  7. Contract Close-Out Submittals, except for record drawings, shall be submitted in commercial quality three ring binders with durable plastic covers. Identify the project on the face and side of the binders. Provide a cover sheet giving complete Project Title, Contractor's and Architect's name, address, phone number, name of project superintendent, and related general information. Include a Table of Contents to identify material in the Project Data Binders and a complete listing of subcontractors and material suppliers. Provide copies of all Certificates, Warranties and related documents as well as Product Data, Maintenance and Operation Data and related information required by the Contract Documents or furnished with items included in the Project. Two (2) sets of these documents shall be submitted.
- A. Submit written certification that the Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for final inspection by Owner and Architect.
- B. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments and sum remaining due.

3.16 WARRANTIES

- A. Provide notarized copies.
- B. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers.
- C. Provide Table of Contents and assemble in three D side ring binders with durable plastic covers. Note: This is in addition to copies of warranties provided with operation and maintenance binders.
- D. Submit prior to final Application for Payment.
- E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within ten (10) days after acceptance, listing date of acceptance as warranty period.

3.17 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, maintenance, and extra materials in quantities specified in individual specification sections.
- B. Deliver to Project site and place in location as directed, obtain receipt prior to final payment.

END OF SECTION

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

- A. Owner requires that this project generate the least amount of trash and waste possible.
- B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
- D. Methods of trash/waste disposal that are not acceptable are:
  - 1. Burning on the project site.
  - 2. Burying on the project site.
  - 3. Dumping or burying on other property, public or private.
  - 4. Other illegal dumping or burying.
- E. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.
- B. Section 01 50 00 - Temporary Facilities and Controls: Additional requirements related to trash/waste collection and removal facilities and services.
- C. Section 01 60 00 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.
- D. Section 01 70 00 - Execution and Closeout Requirements: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

1.03 DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I. Return: To give back reusable items or unused products to vendors for credit.

- J. Reuse: To reuse a construction waste material in some manner on the project site.
- K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

## PART 2 PRODUCTS – NOT USED

## PART 3 EXECUTION

### 3.01 WASTE MANAGEMENT PROCEDURES

- A. See Section 01 30 00 for additional requirements for project meetings, and project documentation.
- B. See Section 01 50 00 for additional requirements related to trash/waste collection and removal facilities and services.
- C. See Section 01 60 00 for waste prevention requirements related to delivery, storage, and handling.
- D. See Section 01 70 00 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

### 3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
- B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and MBI Companies.
- C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
- D. Meetings: Discuss trash/waste management goals and issues at project meetings.
  - 1. Pre-bid meeting.
  - 2. Pre-construction meeting.
  - 3. Regular job-site meetings.
- E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
  - 1. Provide containers as required.
  - 2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
  - 3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
- F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

- H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.
- I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

- A. Section 00 72 00 - General Conditions and 00 73 00 - Supplementary Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.
- B. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- C. Section 01 70 00 - Execution and Closeout Requirements: Contract closeout procedures.
- D. Individual Product Sections: Specific requirements for operation and maintenance data.
- E. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

- A. Project Record Documents: Submit documents to MBI Companies with claim for final Application for Payment.
- B. Operation and Maintenance Data:
  - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. MBI Companies will review draft and return one copy with comments.
  - 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
  - 3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with MBI Companies comments. Revise content of all document sets as required prior to final submission.
  - 4. Submit two sets of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
  - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
  - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
  - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other modifications to the Contract.
  - 5. Reviewed shop drawings, product data, and samples.
  - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.

- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions or alternates utilized.
  - 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
  - 1. Measured depths of foundations in relation to finish first floor datum.
  - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
  - 4. Field changes of dimension and detail.
  - 5. Details not on original Contract drawings.

### 3.02 OPERATION AND MAINTENANCE DATA

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

### 3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. For Each Product, Applied Material, and Finish:
  - 1. Product data, with catalog number, size, composition, and color and texture designations.
  - 2. Information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. 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.
- D. Additional information as specified in individual product specification sections.
- E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

### 3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
  - 1. Description of unit or system, and component parts.
  - 2. Identify function, normal operating characteristics, and limiting conditions.
  - 3. Include performance curves, with engineering data and tests.
  - 4. Complete nomenclature and model number of replaceable parts.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

- C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- D. Include color coded wiring diagrams as installed.
- E. 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.
- F. 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.
  - 1. Include HVAC outdoor and exhaust air damper calibration strategy.
    - a. Include provisions which ensure that full closure of dampers can be achieved.
  - 2. Include Carbon Dioxide Monitoring Protocol.
  - 3. Include Carbon Monoxide Monitoring Protocol.
  - 4. Include Frost Mitigation Strategy for ventilation heat-recovery system.
- G. Provide servicing and lubrication schedule, and list of lubricants required.
- H. Include manufacturer's printed operation and maintenance instructions.
- I. Include sequence of operation by controls manufacturer.
- J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- K. Provide control diagrams by controls manufacturer as installed.
- L. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.
- M. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- N. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- O. Include test and balancing reports.
- P. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of MBI Companies, Consultants, Contractor and subcontractors, with names of responsible parties.
- F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

- G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.
- I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- J. Arrangement of Contents: Organize each volume in parts as follows:
  - 1. Project Directory.
  - 2. Table of Contents, of all volumes, and of this volume.
  - 3. Operation and Maintenance Data: Arranged by system, then by product category.
    - a. Source data.
    - b. Product data, shop drawings, and other submittals.
    - c. Operation and maintenance data.
    - d. Field quality control data.
    - e. Photocopies of warranties and bonds.
  - 4. Design Data: To allow for addition of design data furnished by MBI Companies or others, provide a tab labeled "Design Data" and provide a binder large enough to allow for insertion of at least 20 pages of typed text.

### 3.06 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.
- F. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.
- G. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
- H. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
- I. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

- A. Commissioning is intended to achieve the following specific objectives; this section specifies the Contractor's responsibilities for commissioning:
  - 1. Verify that the work is installed in accordance with Contract Documents and the manufacturer's recommendations and instructions, and that it receives adequate operational checkout prior to startup: Startup reports and Pre-functional Checklists executed by Contractor are utilized to achieve this.
  - 2. Verify and document that functional performance is in accordance with Contract Documents: Functional Tests executed by Contractor and witnessed by the Commissioning Authority are utilized to achieve this.
  - 3. Verify that operation and maintenance manuals submitted to Owner are complete: Detailed operation and maintenance (O&M) data submittals by Contractor are utilized to achieve this.
  - 4. Verify that the Owner's operating personnel are adequately trained: Formal training conducted by Contractor is utilized to achieve this.
- B. Commissioning, including Functional Tests, O&M documentation review, and training, is to occur after startup and initial checkout and be completed before Substantial Completion.
- C. The Commissioning Authority directs and coordinates all commissioning activities; this section describes some but not all of the Commissioning Authority's responsibilities.
- D. The Commissioning Authority is employed by Owner.

1.02 SCOPE OF COMMISSIONING

- A. The following are to be commissioned:
- B. Building envelope:
  - 1. Thermal and moisture integrity.
  - 2. Air tightness.
- C. Structural systems.
- D. Elevating and conveying systems.
- E. Fire Protection Systems.
- F. Plumbing Systems:
  - 1. Water heaters.
  - 2. Booster pumps.
  - 3. Laboratory gas systems.
  - 4. Medical gas systems.
  - 5. Landscape irrigation.
- G. HVAC System, including:
  - 1. Major and minor equipment items.
  - 2. Piping systems and equipment.
  - 3. Ductwork and accessories.
  - 4. Terminal units.
  - 5. Control system.
  - 6. Sound control devices.
  - 7. Vibration control devices.
  - 8. Variable frequency drives.
- H. Special Ventilation:
  - 1. Fume hoods.
  - 2. Laboratory pressurization.
  - 3. Specialty fans.

- 4. Egress pressurization.
- I. Integrated Automation.
- J. Electrical Systems:
  - 1. Power quality.
  - 2. Emergency power systems.
  - 3. Uninterruptible power systems.
  - 4. Lighting controls other than manual switches.
- K. Electronic Safety and Security:
  - 1. Security system, including doors and hardware.
  - 2. Fire and smoke alarms.
- L. Communications:
  - 1. Voice and data systems.
  - 2. Public address/paging.
- M. Other equipment and systems explicitly identified elsewhere in Contract Documents as requiring commissioning.
- N. Sound Transmission Class-rated interior partitions.
- O. Indoor Air Quality Procedures: The Commissioning Authority will coordinate; Contractor will execute.

#### 1.03 RELATED REQUIREMENTS

- A. Section 01 70 00 - Execution and Closeout Requirements: General startup requirements.
- B. Section 01 78 00 - Closeout Submittals: Scope and procedures for operation and maintenance manuals and project record documents.

#### 1.04 REFERENCE STANDARDS

- A. ANSI/RESNET/ICC 301 - Standard for the Calculation and Labeling of the Energy Performance of Low-Rise Residential Buildings using an Energy Rating Index.
- B. ANSI/RESNET/ICC 380 - Standard for Testing Airtightness of Building Enclosures, Airtightness of Heating and Cooling Air Distribution Systems, and Airflow of Mechanical Ventilation Systems.
- C. ASHRAE Std 202 - Commissioning Process for Buildings and Systems.
- D. ASTM E336 - Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings.
- E. ASTM E779 - Standard Test Method for Determining Air Leakage Rate by Fan Pressurization.
- F. ASTM E1827 - Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door.
- G. CSI/CSC MF - Masterformat.
- H. NEBB S110 - Whole Building Technical Commissioning Of New Construction.
- I. PECE (Samples) - Sample Forms for Prefunctional Checklists and Functional Performance Tests; Current Edition.

#### 1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures; except:
  - 1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority, unless they require review by MBI Companies; in that case, submit to MBI Companies first.
  - 2. Submit one copy to the Commissioning Authority, not to be returned.

3. Make commissioning submittals on time schedule specified by Commissioning Authority.
  4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of Prefunctional Checklists or Functional Test requirements; submit in editable electronic format, Microsoft Word preferred.
  5. As soon as possible after submittals made to MBI Companies are approved, submit copy of approved submittal to the Commissioning Authority.
- B. Product Data: If submittals to MBI Companies do not include the following, submit copies as soon as possible:
1. Manufacturer's product data, cut sheets, and shop drawings.
  2. Manufacturer's installation instructions.
  3. Startup, operating, and troubleshooting procedures.
  4. Fan and pump curves.
  5. Factory test reports.
  6. Warranty information, including details of Owner's responsibilities in regard to keeping warranties in force.
- C. Manufacturers' Instructions: Submit copies of all manufacturer-provided instructions that are shipped with the equipment as soon as the equipment is delivered.
- D. Startup Plans and Reports.
- E. Completed Prefunctional Checklists.
- F. Commissioning Issues Log:
1. Construction observations.
  2. Supporting photographs.
- G. Field-test report of partitions for noise isolation.

## 1.06 QUALITY ASSURANCE

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

## PART 2 PRODUCTS

### 2.01 TEST EQUIPMENT

- A. Provide all standard testing equipment required to perform startup and initial checkout and required Functional Testing; unless otherwise noted such testing equipment will NOT become the property of Owner.
- B. Provide all standard testing equipment required to perform building envelope air tightness testing; unless otherwise noted such testing equipment will NOT become the property of Owner.
- C. Calibration Tolerances: Provide testing equipment of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified. If not otherwise noted, the following minimum requirements apply:
1. Temperature Sensors and Digital Thermometers: Certified calibration within past year to accuracy of 0.5 degree F and resolution of plus/minus 0.1 degree F.
  2. Pressure Sensors: Accuracy of plus/minus 2.0 percent of the value range being measured (not full range of meter), calibrated within the last year.
  3. Calibration: According to the manufacturer's recommended intervals and when dropped or damaged; affix calibration tags or keep certificates readily available for inspection.
- D. Equipment-Specific Tools: Where special testing equipment, tools and instruments are specific to a piece of equipment, are only available from the vendor, and are required in order to accomplish startup or Functional Testing, provide such equipment, tools, and instruments as part of the work at no extra cost to Owner; such equipment, tools, and instruments are to become the property of Owner.

- E. Dataloggers: Independent equipment and software for monitoring flows, currents, status, pressures, etc. of equipment.
  - 1. Dataloggers required to for Functional Tests will be provided by the Commissioning Authority and will not become the property of Owner.

### PART 3 EXECUTION

#### 3.01 COMMISSIONING PLAN

- A. Commissioning Authority has prepared the Commissioning Plan.
  - 1. Attend meetings called by the Commissioning Authority for purposes of completing the commissioning plan.
  - 2. Require attendance and participation of relevant subcontractors, installers, suppliers, and manufacturer representatives.
- B. Contractor is responsible for compliance with the Commissioning Plan.
- C. Commissioning Plan: The commissioning schedule, procedures, and coordination requirements for all parties in the commissioning process.
  - 1. Commissioning will be phased (by floors, for example) to minimize the total construction time.
- D. Basis of Design Documentation (BOD): Detailed documentation of the functional requirements of the project; descriptions of the systems, components, and methods chosen to meet the design intent; assumptions underlying the design intent.
  - 1. Basis of Design Documentation is to be prepared by MBI Companies.
- E. Commissioning Schedule:
  - 1. Submit anticipated dates of startup of each item of equipment and system to Commissioning Authority within 60 days after award of Contract.
  - 2. Re-submit anticipated startup dates monthly, but not less than 4 weeks prior to startup.
  - 3. Prefunctional Checklists and Functional Tests are to be performed in sequence from components, to subsystems, to systems.
  - 4. Provide sufficient notice to Commissioning Authority for delivery of relevant Checklists and Functional Test procedures, to avoid delay.

#### 3.02 STARTUP PLANS AND REPORTS

- A. Startup Plans: For each item of equipment and system for which the manufacturer provides a startup plan, submit the plan not less than 8 weeks prior to startup.
- B. Startup Reports: For each item of equipment and system for which the manufacturer provides a startup checklist (or startup plan or field checkout sheet), document compliance by submitting the completed startup checklist prior to startup, signed and dated by responsible entity.
- C. Submit directly to the Commissioning Authority.

#### 3.03 PREFUNCTIONAL CHECKLISTS

- A. A Prefunctional Checklist is required to be filled out for each item of equipment or other assembly specified to be commissioned.
  - 1. No sampling of identical or near-identical items is allowed.
  - 2. These checklists do not replace manufacturers' recommended startup checklists, regardless of apparent redundancy.
  - 3. Prefunctional Checklist forms will not be complete until after award of the contract; the following types of information will be gathered via the completed Checklist forms:
    - a. Certification by installing contractor that the unit is properly installed, started up, and operating and ready for Functional Testing.
    - b. Confirmation of receipt of each shop drawing and commissioning submittal specified, itemized by unit.

- c. Manufacturer, model number, and relevant capacity information; list information "as specified," "as submitted," and "as installed."
      - d. Serial number of installed unit.
      - e. List of inspections to be conducted to document proper installation prior to startup and Functional Testing; these will be primarily static inspections and procedures; for equipment and systems may include normal manufacturer's start-up checklist items and minor testing.
      - f. Sensor and actuator calibration information.
    4. A preliminary list of Prefunctional Checklists is attached, to indicate anticipated scope.
    5. PEI (Samples) found at <http://www.peci.org/library/mcpgs.htm> indicate anticipated level of detail for Prefunctional Checklists.
  - B. Contractor is responsible for filling out Prefunctional Checklists, after completion of installation and before startup; witnessing by the Commissioning Authority is not required unless otherwise specified.
    1. Each line item without deficiency is to be witnessed, initialed, and dated by the actual witness; checklists are not complete until all line items are initialed and dated complete without deficiencies.
    2. Checklists with incomplete items may be submitted for approval provided the Contractor attests that incomplete items do not preclude the performance of safe and reliable Functional Testing; re-submission of the Checklist is required upon completion of remaining items.
    3. Individual Checklists may contain line items that are the responsibility of more than one installer; Contractor shall assign responsibility to appropriate installers or subcontractors, with identification recorded on the form.
    4. If any Checklist line item is not relevant, record reasons on the form.
    5. Contractor may independently perform startup inspections and/or tests, at Contractor's option.
    6. Regardless of these reporting requirements, Contractor is responsible for correct startup and operation.
    7. Submit completed Checklists to Commissioning Authority within two days of completion.
    8. See Section 01 70 00 - Execution and Closeout Requirements for additional general startup requirements.
  - C. Commissioning Authority is responsible for furnishing the Prefunctional Checklists to Contractor.
    1. Initial Drafts: Contractor is responsible for initial draft of Prefunctional Checklist where so indicated in Contract Documents.
    2. Provide all additional information requested by Commissioning Authority to aid in preparation of checklists, such as shop drawing submittals, manufacturers' startup checklists, and O&M data.
    3. Commissioning Authority may add any relevant items deemed necessary regardless of whether they are explicitly mentioned in Contract Documents or not.
    4. When asked to review the proposed Checklists, do so in a timely manner.
  - D. Commissioning Authority Witnessing: Required for:
    1. Each piece of primary equipment, unless sampling of multiple similar units is allowed by the commissioning plan.
    2. A sampling of non-primary equipment, as allowed by the commissioning plan.
  - E. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to Owner.
    1. If difficulty in correction would delay progress, report deficiency to the Commissioning Authority immediately.
- 3.04 FUNCTIONAL TESTS
- A. A Functional Test is required for each item of equipment, system, or other assembly specified to be commissioned, unless sampling of multiple identical or near-identical units is allowed by the final test procedures.
  - B. Contractor is responsible for execution of required Functional Tests, after completion of Prefunctional Checklist and before closeout.
  - C. Commissioning Authority is responsible for witnessing and reporting results of Functional Tests, including preparation and completion of forms for that purpose.

- D. Contractor is responsible for correction of deficiencies and re-testing at no extra cost to Owner; if a deficiency is not corrected and re-tested immediately, the Commissioning Authority will document the deficiency and the Contractor's stated intentions regarding correction.
1. Deficiencies are any condition in the installation or function of a component, piece of equipment or system that is not in compliance with Contract Documents or does not perform properly.
  2. When the deficiency has been corrected, the Contractor completes the form certifying that the item is ready to be re-tested and returns the form to the Commissioning Authority; the Commissioning Authority will reschedule the test and the Contractor shall re-test.
  3. Identical or Near-Identical Items: If 10 percent, or three, whichever is greater, of identical or near-identical items fail to perform due to material or manufacturing defect, all items will be considered defective; provide a proposal for correction within 2 weeks after notification of defect, including provision for testing sample installations prior to replacement of all items.
  4. Contractor shall bear the cost of Owner and Commissioning Authority personnel time witnessing re-testing.
  5. Contractor shall bear the cost of Owner and Commissioning Authority personnel time witnessing re-testing if the test failed due to failure to execute the relevant Prefunctional Checklist correctly; if the test failed for reasons that would not have been identified in the Prefunctional Checklist process, Contractor shall bear the cost of the second and subsequent re-tests.
- E. Functional Test Procedures:
1. Some test procedures are included in Contract Documents; where Functional Test procedures are not included in Contract Documents, test procedures will be determined by the Commissioning Authority with input by and coordination with Contractor.
  2. Examples of Functional Testing:
    - a. Test the dynamic function and operation of equipment and systems (rather than just components) using manual (direct observation) or monitoring methods under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint).
    - b. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc.
    - c. Systems are run through all the HVAC control system's sequences of operation and components are verified to be responding as the sequence's state.
    - d. Traditional air or water test and balancing (TAB) is not Functional Testing; spot checking of TAB by demonstration to the Commissioning Authority is Functional Testing.
  3. Some preliminary Functional Test procedures are included in Contract Documents; the Commissioning Authority has the authority to modify these and will furnish final versions as applicable.
  4. A preliminary list of Functional Tests is attached, to indicate anticipated scope.
  5. Peci (Samples) found at <http://www.peci.org/library/mcpgs.htm> indicated anticipated level of detail for Functional Tests.
- F. Deferred Functional Tests: Some tests may need to be performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions; performance of these tests remains the Contractor's responsibility regardless of timing.

### 3.05 SENSOR AND ACTUATOR CALIBRATION

- A. Calibrate all field-installed temperature, relative humidity, carbon monoxide, carbon dioxide, and pressure sensors and gauges, and all actuators (dampers and valves) on this piece of equipment shall be calibrated. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated.
- B. Calibrate using the methods described below; alternate methods may be used, if approved by Commissioning Authority and Owner beforehand. See PART 2 for test instrument requirements. Record methods used on the relevant Prefunctional Checklist or other suitable forms, documenting initial, intermediate and final results.

- C. All Sensors:
1. Verify that sensor location is appropriate and away from potential causes of erratic operation.
  2. Verify that sensors with shielded cable are grounded only at one end.
  3. For sensor pairs that are used to determine a temperature or pressure difference, for temperature make sure they are reading within 0.2 degree F of each other, and for pressure, within tolerance equal to 2 percent of the reading, of each other.
  4. Tolerances for critical applications may be tighter.
- D. Sensors Without Transmitters - Standard Application:
1. Make a reading with a calibrated test instrument within 6 inches of the site sensor.
  2. Verify that the sensor reading, via the permanent thermostat, gauge or building automation system, is within the tolerances in the table below of the instrument-measured value.
  3. If not, install offset, calibrate or replace sensor.
- E. Sensors With Transmitters - Standard Application.
1. Disconnect sensor.
  2. Connect a signal generator in place of sensor.
  3. Connect ammeter in series between transmitter and building automation system control panel.
  4. Using manufacturer's resistance-temperature data, simulate minimum desired temperature.
  5. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter.
  6. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the building automation system.
  7. Record all values and recalibrate controller as necessary to comply with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction.
  8. Reconnect sensor.
  9. Make a reading with a calibrated test instrument within 6 inches of the site sensor.
  10. Verify that the sensor reading, via the permanent thermostat, gauge or building automation system, is within the tolerances in the table below of the instrument-measured value.
  11. If not, replace sensor and repeat.
  12. For pressure sensors, perform a similar process with a suitable signal generator.
- F. Sensor Tolerances for Standard Applications: Plus/minus the following maximums:
1. Watthour, Voltage, Amperage: 1 percent of design.
  2. Pressure, Air, Water, Gas: 3 percent of design.
  3. Air Temperatures (Outside Air, Space Air, Duct Air): 0.4 degrees F.
  4. Relative Humidity: 4 percent of design.
  5. Barometric Pressure: 0.1 inch of Hg.
  6. Flow Rate, Air: 10 percent of design.
  7. Flow Rate, Water: 4 percent of design.
  8. AHU Wet Bulb and Dew Point: 2.0 degrees F.
- G. Critical Applications: For some applications more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.
- H. Valve/Damper Stroke Setup and Check:
1. For all valve/damper actuator positions checked, verify the actual position against the control system readout.
  2. Set pump/fan to normal operating mode.
  3. Command valve/damper closed; visually verify that valve/damper is closed and adjust output zero signal as required.
  4. Command valve/damper to open; verify position is full open and adjust output signal as required.
  5. Command valve/damper to a few intermediate positions.
  6. If actual valve/damper position does not reasonably correspond, replace actuator or add pilot positioner (for pneumatics).
- I. Isolation Valve or System Valve Leak Check: For valves not associated with coils.
1. With full pressure in the system, command valve closed.

2. Use an ultra-sonic flow meter to detect flow or leakage.

### 3.06 TEST PROCEDURES - GENERAL

- A. Provide skilled technicians to execute starting of equipment and to execute the Functional Tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
- B. Provide all necessary materials and system modifications required to produce the flows, pressures, temperatures, and conditions necessary to execute the test according to the specified conditions. At completion of the test, return all affected equipment and systems to their pre-test condition.
- C. Sampling: Where Functional Testing of fewer than the total number of multiple identical or near-identical items is explicitly permitted, perform sampling as follows:
  1. Identical Units: Defined as units with same application and sequence of operation; only minor size or capacity difference.
  2. Sampling is not allowed for:
    - a. Major equipment.
    - b. Life-safety-critical equipment.
    - c. Prefunctional Checklist execution.
  3. XX = the percent of the group of identical equipment to be included in each sample; defined for specific type of equipment.
  4. YY = the percent of the sample that if failed will require another sample to be tested; defined for specific type of equipment.
  5. Randomly test at least XX percent of each group of identical equipment, but not less than three units. This constitutes the "first sample."
  6. If YY percent of the units in the first sample fail, test another XX percent of the remaining identical units.
  7. If YY percent of the units in the second sample fail, test all remaining identical units.
  8. If frequent failures occur, resulting in more troubleshooting than testing, the Commissioning Authority may stop the testing and require Contractor to perform and document a checkout of the remaining units prior to continuing testing.
- D. Manual Testing: Use hand-held instruments, immediate control system readouts, or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").
- E. Simulating Conditions: Artificially create the necessary condition for the purpose of testing the response of a system; for example apply hot air to a space sensor using a hair dryer to see the response in a VAV box.
- F. Simulating Signals: Disconnect the sensor and use a signal generator to send an amperage, resistance or pressure to the transducer and control system to simulate the sensor value.
- G. Over-Writing Values: Change the sensor value known to the control system in the control system to see the response of the system; for example, change the outside air temperature value from 50 degrees F to 75 degrees F to verify economizer operation.
- H. Indirect Indicators: Remote indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100 percent closed, are considered indirect indicators.
- I. Monitoring: Record parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or the trending capabilities of the relevant control systems; where monitoring of specific points is called for in Functional Test Procedures:
  1. All points that are monitored by the relevant control system shall be trended by Contractor; at the Commissioning Authority's request, Contractor shall trend up to 20 percent more points than specified at no extra charge.
  2. Other points will be monitored by the Commissioning Authority using dataloggers.
  3. At the option of the Commissioning Authority, some control system monitoring may be replaced with datalogger monitoring.

4. Provide hard copies of monitored data in columnar format with time down left column and at least 5 columns of point values on same page.
5. Graphical output is desirable and is required for all output if the system can produce it.
6. Monitoring may be used to augment manual testing.

### 3.07 BUILDING ENVELOPE COMMISSIONING

- A. General: Comply with the following procedural requirements:
  1. NEBB S110 Whole Building Technical Commissioning of New Construction.
  2. ASTM E779 Standard Test Method for Determining Air Leakage Rate by Fan Pressurization.
  3. ASTM E1827 Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door.
  4. ANSI/RESNET/ICC 380 Standard for Testing Airtightness of Building Enclosures, Airtightness of Heating and Cooling Air Distribution Systems, and Airflow of Mechanical Ventilation Systems.
- B. Verify that the building envelope has been sufficiently completed for testing to commence.
- C. Conduct ongoing inspections as construction progresses to document satisfactory installation conditions related to thermal and moisture integrity of the building envelope that become concealed upon completion of construction.
- D. Submit a detailed narrative of proposed pressure test procedures prior to the test. Include a plan view showing proposed installation locations (personnel doors or other similar openings) for blower doors (or flexible ducts for trailer-mounted fans, if used).
- E. Avoid testing on days forecast to experience high winds, rain, or snow.
- F. Test the completed building and demonstrate that the air leakage rate of the building envelope does not exceed the specified requirements.
  1. Use equipment and methods necessary to produce indoor/outdoor pressure differential of 0.2 inches w.g..
- G. Determine location and nature of undesirable air leakage pathways using methods specified in ASTM E1186-17 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems.
- H. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to Owner.
  1. If difficulty in correction would delay progress, report deficiency to the Commissioning Authority immediately.
  2. Insulation for remedying building envelope deficiencies evidenced as excessive air leakage is specified in Section 07 21 00 – Thermal Insulation.
  3. Air barriers for remedying building envelope deficiencies evidenced as excessive air leakage are specified in Section 07 25 26 – Fluid-Applied Membrane Air Barriers.
  4. Sealants for remedying building envelope deficiencies evidenced as excessive air leakage are specified in Section 07 92 00 – Joint Sealants.

### 3.08 FIELD TESTING AND COMMISSIONING OF PARTITIONS FOR NOISE ISOLATION

- A. Conduct testing of partitions requiring a specific STC class indicated on drawings and/or in various specifications sections. Comply with ASTM E336 for testing methods, including requirements of Annex A1 for reduction of flanking sound transmission.
- B. Confirm that the FSTC values are not less than 67 percent of design STC values.
- C. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to Owner.
  1. If difficulty in correction would delay progress, report deficiency to the Commissioning Authority immediately.
  2. Sealants for remedying flanking sound transmission deficiencies evidenced as excessive air leakage are specified in Section 07 92 00 – Joint Sealants.

3.09 OPERATION AND MAINTENANCE MANUALS

- A. See Section 01 78 00 - Closeout Submittals for additional requirements.
- B. Add design intent documentation furnished by MBI Companies to manuals prior to submission to Owner.
- C. Submit manuals related to items that were commissioned to Commissioning Authority for review; make changes recommended by Commissioning Authority.
- D. Commissioning Authority will add commissioning records to manuals after submission to Owner.

END OF SECTION

## 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. Demolition and removal of selected portions of building or structure.
  - 2. Demolition and removal of selected site elements.
  - 3. Salvage of existing items to be reused or recycled.
- B. Related Requirements:
  - 1. Section 01 10 00 – Summary: For restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
  - 2. Section 01 70 00 – Execution and Closeout Requirements: For cutting and patching, procedures.

### 1.03 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and store.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

### 1.04 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
  - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

### 1.05 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.
  - 1. Inspect and discuss condition of construction to be selectively demolished.
  - 2. Review structural load limitations of existing structure.
  - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
  - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
  - 5. Review areas where existing construction is to remain and requires protection.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Engineering Survey: Submit engineering survey of condition of building.
- C. Schedule of Selective Demolition Activities: Indicate the following:
  - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
  - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
  - 3. Coordination for shutoff, capping, and continuation of utility services.
  - 4. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- D. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Submit before Work begins.
- E. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- F. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.07 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.08 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.09 FIELD CONDITIONS

- A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
  - 1. Before selective demolition, Owner will remove the following items:
    - a. All interior walls and elevated floors.
    - b. All mechanical equipment and plumbing fixtures.
- B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. Hazardous materials will be removed by Owner before start of the Work.
  - 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- D. Storage or sale of removed items or materials on-site is not permitted.
- E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
  - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.10 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding.
- B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.11 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
  - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- C. Verify that any hazardous materials have been remediated before proceeding with building demolition operations.
- D. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.
  - 1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

3.02 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.03 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
  - 1. Arrange to shut off utilities with utility companies.
  - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
  - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
  - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
  - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
  - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
  - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
  - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
  - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

#### 3.04 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
  1. Provide protection to ensure safe passage of people around selective demolition area, and to and from occupied portions of building.
  2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
  3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
  4. Cover and protect furniture, furnishings, and equipment that have not been removed.
  5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01 50 00 - Temporary Facilities and Controls.
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
  1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

#### 3.05 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
  1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
  2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
  3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.

5. Maintain fire watch during and for at least 2 hours after flame-cutting operations.
  6. Maintain adequate ventilation when using cutting torches.
  7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
  8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
  9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  10. Dispose of demolished items and materials promptly. Comply with requirements in Section 01 74 19 - Construction Waste Management and Disposal.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Salvaged Items:
1. Clean salvaged items.
  2. Pack or crate items after cleaning. Identify contents of containers.
  3. Store items in a secure area until delivery to Owner.
  4. Transport items to Owner's storage area designated by Owner.
  5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
  2. Pack or crate items after cleaning and repairing. Identify contents of containers.
  3. Protect items from damage during transport and storage.
  4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

### 3.06 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.
- E. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See roofing section(s) for new roofing requirements.
1. Remove existing roof membrane, flashings, copings, and roof accessories.
  2. Remove existing roofing system down to substrate.

3.07 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction, and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."]
  - 1. Do not allow demolished materials to accumulate on-site.
  - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
  - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
  - 4. Comply with requirements specified in Section 01 74 19 - Construction Waste Management and Disposal.
- B. Burning: Do not burn demolished materials.

3.08 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

- A. The extent of concrete work is shown on the drawings.

1.02 SUBMITTALS

- A. Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing and sealing compounds, and others requested by the Architect.
- B. Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with the ACI 315, Details and Detailing of Concrete Reinforcement, showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Show on the shop drawings special reinforcement required and openings through concrete structures.
- C. Submit two (2) copies of laboratory test reports with standard deviation analysis or trial batch data. All concrete materials shall be listed.

1.03 QUALITY ASSURANCE

- A. Comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified.
1. ACI 301, Specifications for Structural Concrete for Buildings
  2. ACI 302, Guide for Concrete Floor and Slab Placement
  3. ACI 304, Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete
  4. ACI 305, Hot Weather Concreting
  5. ACI 306, Cold Weather Concreting
  6. ACI 315, Detailing Manual
  7. ACI 318, Building Code Requirements for Reinforced Concrete
  8. ACI 347, Recommended Practice for Concrete Formwork
  9. CRSI Manual of Standard Practice
  10. ACI 211.1 Standard Practice for Selecting proportions for Normal, Heavyweight, and Mass Concrete.
  11. ACI 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete.
- B. The Contractor is responsible for correcting concrete work that does not conform to the specified requirements, including requirements for strength, tolerances, and finishes.

1.04 QUALITY CONTROL AND TESTING

- A. Materials and operations shall be inspected and tested as work progresses. Failure to detect defective work shall not prevent rejection when defect is discovered, nor shall it obligate the Owner for final acceptance.
- B. If indicated as required by Section 01 40 00 and/or 01 45 00, Special Inspectors shall meet the "Qualifications Standards of Inspectors and Testing Technicians" noted in the Statement of Special Inspections.
- C. Testing agencies shall meet the requirements of "Standard Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction," ASTM E 329.
- D. The following testing service shall be performed by the designated party identified in Sections 01 40 00 and/or 01 45 00.
1. Secure composite samples in accordance with "Standard Method of Sampling Fresh Concrete," ASTM C 172.

2. Mold and cure three specimens from each test required in accordance with "Standard Method of Making and Curing Concrete Test Specimens in the Field," ASTM C 31.
  3. Test specimens in accordance with "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens," ASTM C 39. Two specimens shall be tested at 28 days for acceptance and one shall be tested at 7 days for information.
  4. Make one strength test for each 100 cu. yd. (76.5 m3) or fraction thereof, of each mix design of concrete placed in any one day.
  5. Determine slump of normal-weight concrete sample for each strength test in accordance with "Standard Test Method for Slump of Portland Cement Concrete," ASTM C 143.
  6. Determine total air content of normal-weight concrete sample for each strength test in accordance with "Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method," ASTM C 231 or "Standard Test Method for air content of freshly mixed concrete by the Volumetric Method," C-173.
  7. Determine temperature, unit weight, yield and air content (gravimetric) of concrete sample for each strength test in compliance with ASTM C 138, "Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete."
  8. If water is added at the site, the designated agency shall retest the concrete in accordance with "Standard Test Method for Slump of Portland Cement Concrete" plus whatever other tests the designated agency feels are necessary. No water will be added at the site without the approval of the designated agency.
  9. Qualification of proposed materials and the establishment of mix designs in accordance with "Building Code Requirements for Reinforced Concrete," ACI 318.
  10. Non-Compliant Test Reports: All test reports indicating non-compliance should be faxed immediately to all parties on the test report distribution list. Copies shall be on different colored paper.
  11. Test results will be reported to the Architect and Contractor in writing on the same day that the test is made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in the structure, design compressive strength at 28 days, concrete mix proportions and materials, and compressive breaking strength and type of break for both 7 day tests and 28 day tests.
  12. Perform additional tests of in-place concrete when test results indicate required strength level has not been achieved and/or other characteristics have not been attained in the structure, as directed by the Architect. The testing service may conduct tests to determine the adequacy of concrete by cored cylinders that comply with ASTM C42 or by such other methods as are directed by the Architect. Contractor shall pay for such tests and any additional testing that may be required when concrete is verified to be unacceptable.
  13. Employ, at the Contractor's expense, a testing laboratory to perform Flatness/Levelness Testing. Comply with ASTM E-1155-96, but provide a minimum of one line of sampling in two perpendicular directions through each structural bay.
    - a. Perform testing using a "Dipstick Profiler" within 72 hours of concrete placement.
    - b. Supplement Dipstick testing with use of 10 foot certified straight edge placed randomly on the floor. Floor surface shall not exceed 3/8" below edge of straight edge anywhere along its surface when ends are placed on adjacent high spots.
- E. To facilitate testing and inspection, the Contractor shall:
1. Furnish labor to assist testing agency in obtaining and handling samples at the job site.
  2. Advise testing agency in advance of operations to allow for the assignment of testing personnel and testing.
  3. Provide and maintain for the use of the testing agency adequate facilities for proper curing of concrete test specimens on the project site in accordance with ASTM C 31.

## PART 2 PRODUCTS

### 2.01 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Unless otherwise specified or shown on the drawings, construct formwork for exposed concrete surfaces with plywood, metal, metal framed plywood, or other panel type materials acceptable to the Architect in order to provide exposed surfaces that are continuous, straight, and smooth. To minimize the number of joints and to conform to the joint system shown on the drawings, furnish panels in the largest practicable sizes. Provide form material that is thick enough to withstand pressure of newly placed concrete without bowing or deflection.
- B. Forms for Unexposed Finish Concrete: For surfaces that will be unexposed in the finished structure, form concrete with plywood, lumber, metal, or other material acceptable to the Architect. If lumber is used, it shall be dressed on at least two edges and one side for tight fit.
- C. Automatic machine placement shall be used for curb placement. Submit revised mix design and laboratory test results that meet or exceed requirements for outdoor concrete. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete.

### 2.02 REINFORCING MATERIALS

- A. Reinforcing Bar: ASTM A615, Grade 60.
- B. Welded Wire Fabric: ASTM A185, welded steel wire fabric.
- C. Supports for Reinforcement: Provide supports for reinforcement, including bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Unless otherwise indicated on the drawings, use wire type bar supports complying with CRSI recommendations. Concrete brick, wood, construction debris and other organic material will not be acceptable. Comply with the following:
  - 1. For slabs on grade, where wetted base material will not support chair legs, use supports with sand plates or horizontal runners.
  - 2. Use Mesh-Ups plastic wire mesh supports as manufactured by Lotel, Baton Rouge, 800-535-8375 or equal product as manufactured by Grip Rite/PROLOK or Dayton Superior/Aztec.
  - 3. For concrete surfaces exposed to view, where leg supports are in contact with forms, provide supports with legs that are hot dip galvanized or protected by either plastic or stainless steel.

### 2.03 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150, Type I. Use only one brand of cement throughout the project, unless otherwise acceptable to the Architect.
- B. Normal Weight Aggregates: ASTM C33, or local aggregates that do not comply with ASTM C33, but that have been shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to the Architect.
- C. Fine aggregate: Clean, sharp, natural sand or crushed gravel when used for vehicular wearing surfaces. Manufactured sand may be used elsewhere provided the percentage passing a No. 200 sieve is less than 3%.
- D. Coarse Aggregate: Crushed stone conforming to ASTM C 33 standard specification for concrete aggregates that is clean, uncoated, and processed from natural rock or stone and that contains no clay, mud, loam, or foreign matter.
- E. Combined aggregate gradation for slabs and other designated concrete shall be 8% - 18% for large top size aggregates (1½ in.) or 8% - 22% for smaller top size aggregates (1 in. or ¾ in.) retained on each sieve below the top size and above the No. 100.

- F. Vapor Barrier: The vapor barrier shall be placed over prepared base material where indicated below slabs on grade. Vapor Barrier shall conform to ASTM E 1745, Class A. The membrane shall have a water vapor permeance rate on no greater than 0.01 perms when tested in accordance with ASTM E 1745 Section 7.1. Membrane shall have minimum tensile strength of 58 lbf and a Resistance to Puncture of 2600 grams in accordance with ASTM test standards. Vapor barrier shall be no less than **20 mil** thick in accordance with ACI 302.1R.
1. Available Product: Subject to compliance with requirements, products that are pre-approved for incorporation into Work are Stego Wrap (20 mil) Vapor Barrier by Stego Industries LLC, Perminator EVOH by W. R. Meadows or Dura-Skrim by Raven Industries.
- G. Water: clean, fresh, drinkable.
- H. Admixtures:
1. Water Reducing Admixture: Conforming to ASTM C494, Type A, Eucon WR-75, WR-91 or MR by the Euclid Chemical Company, Pozzolith 322N or Polyheed 997 by Master Builders, or Plastocrete 161 by Sika Chemical Corporation.
  2. Water Reducing, Retarding Admixture: Conforming to ASTM C494, Type D, Eucon Retarder-75 by the Euclid Chemical Co., Pozzolith 100XR by Master Builders, Plastiment by Sika Corp. or Daratard - 17 by WR Grace and Co.
  3. High Range Water Reducing Admixture: Conforming to ASTM C494, Type F or G, (Superplasticizer): Eucon 37, 1037 or Plastol 5000 by the Euclid Chemical Co. or Rheobuild 1000 or 716 by Master Builders or Sikament 686 by Sika Corp.
  4. Non-chloride Accelerator: Accelguard 80 by the Euclid Chemical Co. or Darex Set Accelerator by W.R. Grace or SikaSet NC by Sika Corp.
  5. Air Entraining Admixture: ASTM C260.
  6. Pozzolanic Admixtures: ASTM C618.
  7. Prohibited Admixtures: Calcium Chloride or admixtures containing more than 0.05% Chloride Ions are not permitted. Admixtures indicated as prohibited on drawings shall not be used whether or not they appear in the list above.
- I. Supplementary Cementitious Materials:
1. Fly Ash: ASTM C618, Type F: Ignition loss shall not exceed three (3) percent. Only one source of fly ash shall be used.
  2. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120.
  3. Fly ash shall be used at a maximum percentage rate of 25% of Portland Cement by weight and blast furnace slag at a maximum percentage rate of 40% of Portland Cement by weight. Do not use fly ash for concrete to receive hardeners. The exact amount selected shall be based on a successful test placement.

2.04 RELATED MATERIALS

- A. Mineral Aggregate Base: Open graded stone conforming to ASTM No. 57

Sieve Size , Grading D	Total Percent by Weight, Passing Sieves
1-1/2 in. (37.5 mm)	100
1 in. (25 mm)	95-100
1/2 in. (12.5 mm)	50-80
No. 4 (4.75 mm)	0-10
No. 8 (2.36 mm)	0-5

- B. Waterstops shall be Vinylex RB6316H preformed PVC ribbed waterstop by Vinylex Corporation, Knoxville, Tennessee or equal by Greenstreak or Paul Murphy Plastics Co.

- C. Joint Filler: Provide preformed joint filler at slab expansion joints, joints between floor slabs and walls and other isolation joints. Provide one of the following:
1. Precompressed, impregnated open cell foam.
  2. Asphalt saturated fiberboard complying with ASTM D 1751
  3. Granulated cork between saturated felt or glass fiber felt complying with ASTM D1752 Type H.
- D. Curing Compounds:
1. Clear Curing and Sealing Compound (VOC Compliant, 350 g/l): Liquid type membrane-forming curing compound, clear styrene acrylate type, complying with ASTM C1315, Type I, Class A, 25% solids content minimum. Moisture loss shall be not more than 0.40 Kg/m<sup>2</sup> when applied at 300 sf/gal. Manufacturer's certification is required. Subject to project requirements provide one of the following products: Super Diamond Clear VOX or Super Rez Seal VOX by The Euclid Chemical Co. or Vocomp-30 by W.R. Meadows or Lumiseal WB Plus by L&M Construction Chemicals Inc.
  2. Curing Compound (Strippable for use on slabs to receive direct applied finishes): The curing compound shall conform to ASTM C309. Provide Kurez DR VOX by The Euclid Chemical Co. or 1100 Clear Series by W. R. Meadows or L&M Cure R by L&M Construction Chemicals Inc.
  3. For concrete to receive a special concrete finish (i.e., staining, polishing, etc.), curing compounds called for in those specification sections, if any, shall take precedence over curing compounds specified herein solely for those areas to receive such finish.
- E. Bonding Compound: Provide polyvinyl acetate, rewettable type compound. Do not use in areas subject to moisture. Euco Weld by Euclid Chemical Co. or Weldcrete by Larsen or LiquidWeld by Sika Corp.
- F. Epoxy Adhesive: Where called for, compound shall be a 2 component, 100% solids, 100% reactive compound suitable for use on dry or damp surfaces.
- G. Non-shrink Grout: The grout shall conform to CRD-C621-80, "Corps of Engineers Specification for Non-shrink Grout". Euco NS by the Euclid Chemical Co. or Masterflow 713 by Master Builders or SikaGrout 212 by Sika Corp.
- H. High Flow Grout: Where high fluidity and/or increased placing time is required, use high flow grout. The factory pre-mixed grout shall conform to ASTM C1107, "Standard Specification for Packages Dry, Hydraulic-Cement Grout (Non-Shrink)." In addition, the grout manufacturer shall furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95% bearing under a 18" x 36" base plate. Provide Hi-Flow Grout by The Euclid Chemical Co. or SikaGrout 328 by Sika Corp or MasterFlow 928 by Master Builders.
- I. Non-Oxidizing Metallic Hardener: The specified non-oxidizing metallic floor hardener shall be formulated, processed and packaged under stringent quality control at the manufacturer's owned and controlled factory. The hardener shall be a mixture of specially processed non-rusting aggregate, selected Portland cement and necessary plasticizing agents. Product shall be Diamond-Plate by The Euclid Chemical Co.
1. For concrete to receive a special concrete finish (i.e., staining, polishing, etc.), hardeners called for in those specification sections shall take precedence over hardeners specified herein solely for those areas to receive such finish.
- J. Mineral Aggregate Hardener: The specified mineral aggregate hardener shall be formulated, processed and packaged under stringent quality control at the manufacturer's owned and controlled factory. The hardener shall be a factory-blended mixture of specially processed graded mineral aggregate, selected Portland cement and necessary plasticizing agents. Product shall be Surflex by The Euclid Chemical Co. or MasterTop 100 by Master Builders.

1. For concrete to receive a special concrete finish (i.e., staining, polishing, etc.), hardeners called for in those specification sections shall take precedence over hardeners specified herein solely for those areas to receive such finish.
- K. Liquid Densifier/Sealer: The liquid densifier compound shall be a silicate based sealer which penetrates concrete surfaces, increases abrasion resistance and provides a "low-sheen" surface that is easy to clean and eases the problem of tire mark removal. Product shall have a minimum solids content of 20% of which 50% must be silicate. Provide Diamond Hard by The Euclid Chemical Company or Liqui-Hard by W.R. Meadows or Seal Hard by L&M Construction Chemicals Inc. or SikaFloor 3S by Sika Corp.
  1. For concrete to receive a special concrete finish (i.e., staining, polishing, etc.), densifiers/sealers called for in those specification sections shall take precedence over densifiers/sealers specified herein solely for those areas to receive such finish.
- L. Integral Color Dye for Exterior Application: Colored concrete system by L.M. Scofield Company or equal approved prior to bidding, having the following characteristics:
  1. Admixture shall be a colored, water-reducing, admixture containing no calcium chloride with coloring agents that are limeproof and ultra-violet resistant.
  2. Colored admixture shall conform to the requirements of ACI 303.1, ASTM C979, ASTM C494 and ASSHTO M194.
  3. Curing compound shall comply with ASTM C309.
  4. Color: To be selected by Architect from manufacturer's standard chart.
- M. One Part Repair Topping: Latex and microsilica modified cementitious mortar designed for use as a floor or deck topping at thicknesses of 1/16" to 3/8". Product shall be Thin-Top Supreme by Euclid Chemical Co. or SikaTop 122 Plus by Sika Corp. for thicknesses up to 2". Product shall be Concrete-Top Supreme by Euclid Chemical Co. or SikaTop 121 Plus by Sika Corp.
- N. Underlayment Compound: Free-flowing, self-leveling, pumpable cementitious base compound, "Super Flo-Top" by The Euclid Chemical Co. or SikaLevel 315 by Sika Corp or Level Set 300 by TEC. The compound shall exhibit the following properties:

Compressive Strength (ASTM C109)	- 4400 PSI @ 7 days - 5000 PSI @ 28 days
Bond Strength (ASTM C1042)	- 700 PSI @ 7 days - 1000 PSI @ 28 days

2.05 MISCELLANEOUS MATERIALS

- A. Fill concrete spandrel blocks with concrete and reinforce with two (2) No. 4 bars to form cap beams at top of all masonry walls unless noted otherwise.
- B. Fill steel pan stair risers and landings with non-slip concrete, poured in place and reinforced with 2" diamond mesh lath or fiber mesh. The fill shall consist by volume of 1 part Portland cement, 1-1/2 parts sand and 3 parts pea gravel. Fill shall have a smooth steel trowel finish.
- C. Provide 2'-6" x 2'-6" corner bars of same size and number as footing reinforcing in all foundation corners unless noted otherwise.
- D. Concrete slabs on grade at dumpster pads and equipment pads shall be 6 inch concrete reinforced with WWF 6 x 6 – W2.9 x W2.9 over 4 inches of crushed stone unless noted otherwise on the drawings.

2.06 MIX DESIGN

A. Preparation

1. Prepare design mixes for each type and strength of concrete in accordance with ACI 318, "Building Code Requirements for Structural Concrete," Section 5.3 and with applicable provisions of ASTM C94. Submit written reports of each proposed mix for each class of concrete on the Mix Design Submittal Form included at the end of this specification at least 15 days before the start of work.
2. Provide special mix design for use with automatic machine placement of curbs.
3. The design mix shall provide normal weight concrete with 28 day compressive strength as indicated on the drawings or as shown below if not otherwise indicated.

B. Admixtures

1. All concrete shall contain the specified water reducing admixture or high-range water-reducing admixture. All concrete slabs placed at air temperatures below 50° F shall contain the specified non-chloride accelerator. All concrete required to be air entrained shall contain an approved air entraining mixture. All pumped concrete and concrete with a W/cm of less than 0.50 shall contain the specified high-range water-reducing admixture.
  - a. Use an air entraining admixture in all concrete structures and slabs exposed to freezing and thawing or subjected to hydrostatic pressure:  
  
2.5% to 5.5% for maximum 2 inches aggregate  
4.5% to 7.5% for maximum 3/4 inch aggregate  
5.5% to 8.5% for maximum 1/2 inch aggregate
  - b. All trowel finished interior slabs: Maximum air content of 3% (do not add air entraining admixture).
2. Water/Cement Ratio:
  - a. Concrete exposed to freezing and thawing: 0.50
  - b. Concrete subject to deicers and/or required to be watertight: 0.45
  - c. Concrete subject to brackish water or salt spray: 0.40
  - d. Interior trowel finished slabs subject to vehicular traffic: 0.53
  - e. All other concrete: 0.58
3. Use the amounts of admixtures recommended by the manufacturer for climatic conditions prevailing at the time of placing. Adjust quantities and types of admixtures as required to maintain quality control.

2.07 SELECTION OF PROPORTIONS

A. General:

Concrete shall be composed of Portland cement, fine aggregate, coarse aggregate, water, admixtures, and as specified, Air Entraining Admixture. Proportions of ingredients shall produce concrete that will work readily into corners and angles of forms, bond to reinforcement, without segregation or excessive bleed water forming on the surface. Proportions of materials shall be in accordance with ACI 211.1, "Recommended Practice for Selecting Proportions for Normal, Heavy and Mass Weight Concrete."

1. Proportions of ingredients shall be selected by past field experience or, in lieu of past performance, laboratory trial mixes to produce placeability, durability, specified strength and properties specified.

B. Required Average Strength Above Specified Strength:

Determinations of required average strength ( $f'c$ ) shall be in accordance with ACI 318, "Building Code Requirements for Reinforced Concrete," and evaluations of compressive strength results of field concrete shall be in accordance with ACI 214, "Recommended Practice for Evaluation of Strength Test Results of Concrete."

1. Past Field Experience - Proportions shall be established on the actual field experience of the ready-mix producer with the materials proposed to be employed. Standard deviations shall be determined by 30 consecutive tests (or two groups of tests totaling 30 or more).

- a. Average strength ( $f'c$ ) shall exceed specified strength ( $f'c$ ) by at least:

400 psi (2.8 MPa)	-	standard deviation is less than 300
550 psi (3.8 MPa)	-	standard deviation is 300 to 400
700 psi (4.8 MPa)	-	standard deviation is 400 to 500
900 psi (6.2 MPa)	-	standard deviation is 500 to 600
1200 psi (8.3 MPa)	-	standard deviation is above 600 or unknown

2. Trial Mixes - When the ready-mix producer does not have a record of past performance, the combination of materials and the proportions selected shall be selected from trial mixes having proportions and consistencies suitable for the work based on ACI 211.1-91, using at least three different water-cement ratios which will produce a range of strengths encompassing those required.

- a. Average strength ( $f'c$ ) required shall be:

Specified compressive strength	--	Required average compressive strength
Less than 3000 ( $f'c$ psi)	--	$f'c + 1000$ ( $f'c$ psi)
3000 to 5000 ( $f'c$ psi)	--	$f'c + 1200$ ( $f'c$ psi)
Over 5000 ( $f'c$ psi)	--	$f'c + 1400$ ( $f'c$ psi)

2.08 CONCRETE QUALITIES REQUIRED

A. Specified Compressive Strength:

Specified Compressive ( $f'c$ ) Strength @ 28 days, unless noted higher on the drawings, shall be:

3000 psi (21 MPa) – Interior floor slabs (< 6" thick) with applied finishes and footings.

4000 psi (28 MPa) – Interior floor slabs (> or equal to 6" thick)

4000 psi (28 MPa) – Walks, curbs, columns, beams and other concrete exposed to the weather.

B. Slump:

1. Consolidation by vibration: 3 in. (76 mm) not to exceed 4 in. (102 mm).
2. Consolidation by other methods: 4 in. (102 mm) not to exceed 5 in. (127 mm).
3. Placement and consolidation by automatic machine: Slump as required by mix design.

- a. Any concrete containing high-range water-reducing admixture (superplasticizer) shall have a maximum slump of 9" unless otherwise approved by the Architect. The concrete shall arrive at job site at a slump of 2" to 3", (3" to 4" for concrete receiving a "shake-on" hardener or lightweight concrete), be verified, then high-range water-reducing admixture added to increase slump to approved level. All other concrete shall have a maximum slump of 4."

- b. Slump shall be determined by ASTM C 143-78, "Standard Test Method for Slump of Portland Cement Concrete."

- C. “Quick Dry” Concrete: Maximum W/cm – 0.40, superplasticized, 3% maximum air content. The floor finish shall be as required by the manufacturer of the specified floor coating or covering.
- D. Aggregate Size: Maximum size of coarse aggregate shall not exceed:
  - 1. One-fifth narrowest dimension between forms.
  - 2. Three-fourths minimum clear spacing between reinforcing bars.
  - 3. One-third the thickness of slabs.
  - 4. Use 1½” top size in all trowel finished interior slabs-on-grade subject to vehicular traffic.

## 2.09 CONCRETE CLEANERS

- A. Citrus based industrial degreaser and detergent. Acceptable products include:
  - 1. AC-4450 ORANGE NATURAL 20 CONCENTRATE as distributed by Interstate Products Inc. 800-474-7294
  - 2. Commercial Strength Contractor’s Solvent as manufactured by Orange-Sol Industrial Products Inc. 800-279-8822
  - 3. De-Solv-It Heavy Duty 24 as manufactured by Orange-Sol Industrial Products Inc. 800-279-8822

## PART 3 EXECUTION

### 3.01 PRE-CONCRETE CONFERENCE

- A. At least 35 days prior to start of the concrete construction schedule, the contractor shall conduct a meeting to review the proposed mix designs and to discuss the required methods and procedures necessary to achieve the required concrete quality. Contractor shall send a pre-concrete conference agenda to all attendees 20 days prior to the scheduled date of the conference.

### 3.02 PREPARATION FOR SLABS ON GRADE

- A. Subgrade: Before any base material is installed, compact the subgrade of the area to be paved to 100% of optimum density as determined by ASTM D698 (Standard Proctor).
- B. Base: Install a mineral aggregate base of the type specified above in accordance with Section 303 of the TDOT specifications.
- C. The base must not depress more than 1/2” under a fully loaded ready-mix concrete truck.

### 3.03 FORMWORK

- A. Design, construct, erect, brace, and maintain formwork according to ACI 301.
- B. Use metal form ties that are factory made, adjustable in length, designed to prevent form deflection, and either removable or snap-off and that will prevent the concrete surface’s being spalled when the ties are removed. If snap-off ties are used, the portion remaining within the concrete after removal must be at least 1-1/2 inches inside the concrete unless the drawings indicate otherwise.
- C. Provide openings in concrete formwork to accommodate the work of other trades. Determine the size and location of openings, recesses, and chases from the trades providing such work. Accurately place and securely support items built into forms.
- D. Clean thoroughly forms and adjacent surfaces that are to receive concrete. Remove chips, wood, sawdust, dirt, and any other debris just before the concrete is placed. After concrete placement, retighten forms if necessary to eliminate mortar leaks.

### 3.04 PLACING VAPOR BARRIER

- A. Install vapor barrier in accordance with ASTM E1643.

- B. Arrange layout of vapor barrier to minimize seams and penetrations.
- C. Unroll vapor barrier over compacted aggregate base.
- D. Overlap all seams a minimum of six inches and seal with tape.
- E. All penetrations must be sealed using a combination of seam tape and mastic in accordance with manufacturer's latest printed instructions.
- F. Turn vapor barrier up at edge of slab to masonry wall juncture to provide bond break.

### 3.05 PLACING REINFORCEMENT

- A. For details and methods of placing reinforcement and supports, comply with the specified codes and standards, the recommended practice of the CRSI as outlined in "Placing Reinforcing Bars," and these specifications.

### 3.06 INSTALLATION OF WATERSTOPS

- A. Provide continuous waterstops and install waterstops in concrete joints where indicated.
- B. Carry waterstops in walls into lower slabs and join to waterstops in slabs with appropriate fittings.
- C. In water bearing structures, provide waterstops in all joints, whether or not indicated on drawings.
- D. Secure waterstops accurately to position and line as indicated on the drawings using factory installed hog rings or factory pre-punched holes in the outermost rib with tie wire. Do not drive nails, screws, or other fasteners through the waterstop at any time at any location.
- E. Secure at intervals of not more than 15 inches to prevent movement during the pour of concrete.
- F. Terminate waterstops 3 inches from the top of finished surfaces of walls and slabs, unless otherwise specified on the drawings.

### 3.07 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete the formwork installation, reinforcing steel, and items to be embedded or cast in.
- B. Use mechanical vibrating equipment, including a laser screed, supplemented by hand spading, rodding, or tamping to consolidate placed concrete. The equipment and procedures used to consolidate the concrete shall comply with the recommended practices of ACI 309 and suit both the type of concrete and project conditions.
- C. Until the placing of a panel or section is completed, deposit and consolidate concrete slabs in a continuous operation within construction joints.
- D. Consolidate concrete during placing operations so that it is thoroughly worked around reinforcement and other embedded items and into corners.
- E. Bring slab surfaces to the correct level with a straightedge and strike off. Use appropriate bull floats or straightedges to smooth the surface, leaving it free from humps and hollows. Do not sprinkle water on the plastic surface. Do not disturb the slab surfaces before starting finishing operations.
- F. Maintain reinforcement in the proper position during placement operations.
- G. Cold Weather Placement: Comply with ACI 306 and the requirements therein specified to protect concrete work from physical damage or reduced strength due to frost, freezing, or low temperatures.

- H. Hot Weather Placement: When the weather is hot enough to impair the concrete's quality and strength, place the concrete as specified herein and in ACI 305.

### 3.08 JOINTS

- A. Locate and install construction joints (which are not shown on the drawings) as approved by the Architect so that the strength and appearance of the structure will not be impaired.
- B. Provide keyways at least 1-1/2 inches deep in construction joints that are in walls and slabs or between walls and footings. Bulkheads designed for this purpose may be used if accepted by the Architect. Construction joints, in slabs subjected to vehicular traffic, shall have round, square or diamond dowels as indicated on the drawings.
- C. Place construction joints perpendicular to the main reinforcement. Continue all reinforcement across construction joints of structural members.
- D. Construct isolation joints in slabs on the ground wherever there is contact between slabs on the ground and vertical surfaces and wherever else indicated on the Drawings.
- E. Contraction (control) joints in slabs on ground as shown on the Drawings shall have a maximum spacing of 30 times slab thickness (up to a maximum of fifteen (15) feet) each way if not shown otherwise.
- F. Saw-Cut Control Joints:
1. Primary Method: Soff-Cut System method, by Soff-Cut International, Corona, CA, 800-776-3328. Finisher must have documented successful experience in the use of this method prior to this project. Install cuts within 2 hours after final finish at each saw cut location. Use 1/8 inch thick blade, cutting 1-1/4 inch into slab.
  2. Optional Method (Where Equipment is Not Available for Primary Method): Properly time cutting with the set of the concrete. Saw-cut control joints within 12 hours after finishing. Start cutting as soon as the concrete has hardened sufficiently to prevent aggregates being dislodged by the saw. Complete cutting before shrinkage stresses become sufficient to produce cracking. Use 1/4 inch thick blade, cutting 1/4 slab depth.

### 3.09 FINISH OF FORMED SURFACES

- A. Finishes to be in accordance with ACI 301.
- B. Trowel Finish: Apply a trowel finish to all interior slab surfaces unless otherwise noted on drawings. Concrete shall be placed, consolidated, struck-off and leveled to proper elevation using a laser screed, or vibratory screed. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Cut down high spots and fill low spots with highway straightedge. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture. Surface shall achieve an F(F) 20 – F(L) 17 tolerance. Surface shall then be troweled, at least twice, to a smooth dense finish, free of trowel marks, uniform in texture and appearance, and achieve a tolerance of F(F) 25 and F(L) 20 minimum overall composite and F(F) 17 and F(L) 15 minimum at any individual section measured according to ASTM E 1155. For floors to receive an applied floor covering, grind smooth any surface defects that could telegraph through applied floor covering or repair as necessary with specified repair compound or underlayment to achieve specified tolerance. For finishes in which the concrete surface is exposed to view, grinding or reparations involving compounds or underlayments are not acceptable and shall not be used to achieve specified floor tolerances.
- C. Non-Oxidizing Metallic Floor Hardener: All slabs, in areas subject to vehicular traffic including all loading dock areas and any other areas noted on drawings, shall receive an application of non-oxidizing, metallic floor hardener applied at a rate of 1.5 lbs/ft<sup>2</sup>. Immediately following first floating operation, uniformly distribute approximately 2/3 of required weight of non-oxidizing metallic floor hardener over concrete

surface, by mechanical spreader, and embed by means of power floating. Hardener shall be floated in and second application made. Surface shall be floated again to properly bond hardener to base concrete slab. Surface shall then be troweled, at least twice, to a smooth dense finish.

- D. Mineral Aggregate Hardener: All slabs, in areas noted on drawings, shall receive an application of mineral aggregate hardener applied at a rate of 1.2 lbs/ft<sup>2</sup>. Hardener shall be applied in two applications by mechanical spreader. First shake shall comprise 2/3 of specified amount of hardener. This application shall be made after initial floating operation unless climatic conditions dictate earlier application. Hardener shall be floated in and second application made. Surface shall be floated again to properly bond hardener to base concrete slab. Surface shall then be troweled, at least twice, to a smooth, dense finish.
- E. Non-slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps, and ramps and elsewhere as indicated by the drawings or schedules. Texture shall be as approved by Architect from sample panels.
- F. Liquid Densifier/Sealer Finish: Apply this compound on exposed interior floors subjected to vehicular abrasion and shake on hardener slabs as indicated on the drawings. Application shall be made in strict accordance with directions of the manufacturer and just prior to completion of construction. Spray, squeegee or roll on liquid densifier to clean, dry concrete surface. Liquid should be scrubbed into surface with mechanical scrubber. Keep the surface wet with the densifier during the application process. When product thickens, but not more than 60 minutes after initial application, surface shall be squeegeed or vacuumed to remove all excess liquid
- G. Sealer/Dustproofer Finish: Apply a second coat of the specified curing and sealing compound to interior concrete floors where shown on the drawings or in schedules to be sealed concrete. The compound shall be applied in strict accordance with the directions of the manufacturers and just prior to completion of construction.

### 3.10 CURING

- A. After placing and finishing the concrete, start initial curing as soon as free water has disappeared from concrete surface. Keep continuously moist for not less than 7 days and above 50° F. When high early strength concrete is used, the temperature requirement may be reduced to three days.
- B. Begin final curing immediately after initial curing and before the concrete has dried. Continue final curing in accordance with ACI 301. Avoid rapid drying at the end of the final curing period.
- C. All exposed interior slabs, not receiving a liquid densifier, and troweled slabs receiving mastic applied adhesives or "shake-on" hardeners shall be cured with the specified curing and sealing compound. Exterior slabs, sidewalks, curbs, and architectural concrete, not receiving a penetrating sealer, shall be cured with the specified clear, non-yellowing curing and sealing compound. Maximum coverage shall be 400 ft<sup>2</sup>/gallon on steel troweled surfaces and 300 ft<sup>2</sup>/gallon on floated or broomed surfaces for the curing/sealing compound.
- D. Curing Compound (Strippable): Use the specified strippable curing compound on surfaces to be covered with finish or coating material applied directly to concrete, such as liquid densifier/sealer, waterproofing, dampproofing, membrane roofing, flooring, painting, and other coatings and finish materials. Apply in accordance with manufacturer's instructions.

### 3.11 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Unless the drawings show otherwise or the Architect directs, fill in holes and openings left in concrete structures for the work of other trades once that work is in place. Mix, place, and cure concrete as specified herein to blend with in-place construction. Provide other miscellaneous concrete filling shown on the drawings or necessary to complete the work.

- B. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on the drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with the certified diagrams or templates of the manufacturer furnishing the machines and equipment.
- C. Nonshrink Grout: Grout base plates and foundations as indicated using specified non-shrink grout. Use non-metallic grout for exposed conditions, unless otherwise indicated.
  - 1. Where high fluidity and/or increased placing time is required use the specified high flow grout. This grout shall be used for all base plates larger than 10 square feet.

### 3.12 EVALUATION AND ACCEPTANCE

- A. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.
- B. **No cracks which affect structural integrity will be accepted.** Affected areas to be removed and replaced. Submit repair plan to structural engineer for approval before beginning repairs
- C. Cracks which do not affect structural integrity:
  - 1. Cracks consistently greater than 1/4" in width will not be accepted, remove and replace section to nearest existing joint.
  - 2. Cracks showing vertical separation of plane will not be accepted remove and replace section to nearest existing joint.
  - 3. Cracks less than 1/4" in width, occurring in appearance sensitive areas (i.e. front entry, front sidewalk, etc.), may require replacement. Final decision resides with the Owner.
  - 4. Cracks less than a 1/4" in width in non-appearance sensitive areas will be filled with Bonsal vinyl concrete repair compound, or approved equal, following manufacturer's recommended application procedures.

### 3.13 WALKS AND CURBS

- A. Walks and sidewalks shall be not less than 4" thick, placed over a 4" layer of porous fill as specified, and marked off with surface joints at 6'-0" o.c. as shown. Install expansion joints between walks and building, at changes in walk direction, at 30'-0" o.c., and elsewhere as shown. Expansion joints shall be formed with 1/2" thick preformed filler.
- B. Curbs shall be constructed to size and profile shown, placed over binder course of paving. Provide expansion joints at 50 feet on center maximum.
- C. All edges, joints and margins shall be straight and true and rounded with jointing and edging tools.
- D. Walks shall be sloped 1/4" per foot.

### 3.14 REPAIR OF DEFECTIVE AREAS

- A. With prior approval of method and procedure by the Engineer, all repairs of defective areas shall conform to ACI 301, Section 5.3.7, except that the specified bonding compound must be used.
- B. Leveling of floors for subsequent finishes shall be achieved by use of the specified underlayment material.
- C. All exposed floors shall be leveled, where required, with the specified self-leveling repair topping.
- D. Repair methods not specified above may be used, subject to acceptance of Engineer.

3.15 CLEANING AND PROTECTION

- A. Protect corners, edges, and surfaces of cast-in-place architectural concrete from damage; use guards and barricades.
- B. Protect cast-in-place architectural concrete from staining, laitance, and contamination during remainder of construction period.
- C. Clean cast-in-place architectural concrete surfaces after finish treatment to remove stains, markings, dust, and debris. Use power washer set to low pressure (800 psi maximum) with orange cleaner/degreaser to clean all exposed exterior concrete.
- D. Wash and rinse surfaces according to concrete finish applicator's recommendations and cleaning solutions written instructions. Protect other Work from staining or damage due to cleaning operations.
- E. Do not use cleaning materials or processes that could change the appearance of cast-in-place architectural concrete finishes.

END OF SECTION

# CONCRETE MIX DESIGN SUBMITTAL FORM

Project: \_\_\_\_\_  
City: \_\_\_\_\_  
General Contractor: \_\_\_\_\_  
Concrete Contractor: \_\_\_\_\_  
Concrete Strength (Class): \_\_\_\_\_  
Use (describe): \_\_\_\_\_

## Design Mix Information

Based on Standard Deviation Analysis Please check one ☐  
Trial Mix Test Data ☐

## Design Characteristics:

Density  pcf  
Strength  psi (28 day)  
Air  % specified

*If trial mixes are used the Mix Design is proportioned to achieve  $f'_{cr} = f'_c + 1200$  psi  
(1400 psi for strength higher than 5000 psi at 28 days)*

<u>MATERIALS</u>	<i>Type/ Source</i>	<i>Specific Gravity</i>	<i>Weight/lb.</i>	<i>Absolute Vol. cu.ft.</i>
Cement				
Flyash				
Microsilica				
Coarse Aggregate				
Fine Aggregate				
Water				
Air				
Other				
<b>TOTAL</b>				27.0 cu. ft.

\* Water/Cement Ratio (lbs. water/lbs. cement) = \_\_\_\_\_ %

<u>ADMIXTURES</u>	<b>Manufacturer</b>	<b>Dosage oz/cwt</b>
Water Reducer		
Air Entraining Agent		
High Range Water Reducer		
Non-Corrosive Accelerator		
Other		

Slump before HRWR \_\_\_\_\_ inches  
Slump after HRWR \_\_\_\_\_ inches

## **Standard Deviation Analysis (from experience records):**

<b># of Test Cylinders Evaluated:</b>	<input type="text"/>
<b>Standard Deviation:</b>	<input type="text"/>

$$f'_{cr} = f'_c + 1.34s \text{ or } f'_{cr} = f'_c + 2.33s - 500$$

(Refer to ACI 301 for increased deviation factor when less than 30 tests are available)

## **LABORATORY TEST DATA**

*Compressive Strength*

Age (days)	Mix # 1	Mix #2	Mix #3
7	psi	psi	psi
7	psi	psi	psi
28	psi	psi	psi
28	psi	psi	psi
28 average	psi	psi	psi

## **REQUIRED ATTACHMENTS:**

Coarse Aggregate Gradation Report  
Fine Aggregate Gradation Report  
Concrete Compressive Strength Data or Trial Mixture Test Data  
Admixture Compatibility certification letter

*Please Check*


## **Submitted by:**

Name: \_\_\_\_\_

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

Phone #: \_\_\_\_\_

Main Plant Location: \_\_\_\_\_

Miles from Project: \_\_\_\_\_

Secondary Plant Location: \_\_\_\_\_

Miles from Project: \_\_\_\_\_

Date: \_\_\_\_\_

PART 1 GENERAL

1.01 SCOPE:

- A. Furnish all labor, materials, equipment, and supervision to provide and install polished concrete in areas indicated on the drawings.

1.02 REFERENCES

- A. American Concrete Institute (ACI):
  - 1. ACI 302.1R Guide for Concrete Floor and Slab Construction
- B. ASTM International:
  - 1. ASTM C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
  - 2. ASTM C171 Standard Specification for Sheet Materials for Curing Concrete.
  - 3. ASTM C779 Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.
- C. Reunion Internationale des Laboratoires D'Essais et de Recherches sur les Materiaux et les Constructions (RILEM):
  - 1. Rilem Test Method 11.4 Standard Measurement of Reduction of Moisture Penetration Through Horizontal Concrete
- D. National Floor Safety Institute (NFSI):
  - 1. NFSI Test Method 101-A Standard for Evaluating High-Traction Flooring Materials, Coatings, and Finishes.

1.03 PERFORMANCE REQUIREMENTS

- A. Provide polished flooring that has been selected, manufactured and installed to achieve the following:
  - 1. Abrasion Resistance: ASTM C779, Method A, high resistance, no more than 0.008 inch wear in 30 minutes.
  - 2. Reflectivity: Increase of 35% as determined by standard gloss meter.
  - 3. Waterproof Properties: Rilem Test Method 11.4, 70% or greater reduction in absorption.
  - 4. High Traction Rating: NFSI 101-A, non-slip properties.
- B. Design Requirements:
  - 1. Hardened Concrete Properties:
    - a. Minimum Concrete Compressive Strength: 3500 psi (24 MPa).
    - b. Normal Weight Concrete: No lightweight aggregate.
    - c. Non-air entrained.
  - 2. Placement Properties:
    - a. Natural concrete slump of 4 1/2 inches - 5 inches. Admixtures may be used.
    - b. Flatness Requirements:
      - i. Overall FF 40.
      - ii. Local FF 20.
  - 3. Hard-Steel Troweled (3 passes) Concrete: No burn marks. Finish to ACI 302.1R, Class 5 floor.

1.04 ACTION SUBMITTALS

- A. General: Submit listed action submittals in accordance with Division 01.
- B. Shop Drawings: Indicate information on shop drawings as follows:
  - 1. Typical layout including dimensions and floor grinding schedule.
  - 2. Plan view of floor and joint pattern layout.
  - 3. Areas to receive colored surface treatment.
  - 4. Hardener, sealer, densifier in notes.

- C. Product Data: Submit product data, including manufacturer's SPEC-DATA® product sheet, for specified products.
  - 1. Material Safety Data Sheets (MSDS).
  - 2. Preparation and concrete grinding procedures.
  - 3. Colored Concrete Surface, Dye Selection Guides.

#### 1.05 INFORMATIONAL SUBMITTALS

- A. Quality Assurance:
  - 1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties as cited in 1.03 Performance Requirements.
  - 2. Certificates:
    - a. Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
    - b. Letter of certification from the National Floor Safety Institute confirming the system has been tested and passed phase Two Level of certification when tested by Method 101-A.
    - c. Current contractor's certificate signed by manufacturer declaring contractor as an approved installer of polishing system.
  - 3. Manufacturer's Instructions: Manufacturer's installation instructions.

#### 1.06 CLOSEOUT SUBMITTALS

- A. Warranty: Submit warranty documents specified.
- B. Operation and Maintenance Data: Submit operation and maintenance data for installed products.
  - 1. Include:
    - a. Manufacturer's instructions on maintenance renewal of applied treatments.
    - b. Protocols and product specifications for joint filing, crack repair and/or surface repair.

#### 1.07 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
  - 2. Installer trained and holding current certification for installation by manufacturer.
  - 3. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction and approving application method.
- B. Regulatory Requirements.
  - 1. NFSI Test Method 101-A Phase Two Level High Traction Material.
  - 2. Applicable Building Codes
- C. Mock-Ups:
  - 1. Mock-Up Size: 100 s.f. sample panel at jobsite at location as directed under conditions similar to those which will exist during actual placement.
  - 2. Mock-up will be used to judge workmanship, concrete substrate preparation, operation of equipment, material application, color selection and shine.
  - 3. Allow adequate time for inspection of mock-up before proceeding with work.
  - 4. When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

#### 1.08 PRE-INSTALLATION MEETING

- A. Pre-installation meeting: To be attended by the Architect, General Contractor, Concrete Sub-Contractor, and Polished Concrete Sub-Contractor.

- B. Issue a proposed agenda to all parties requested to attend not less than 5 working days prior to the meeting. Include:
1. Environmental requirements
  2. Scheduling and phasing of work
  3. Coordinating with other work and personnel
  4. Protection of adjacent surfaces.
  5. Surface preparation
  6. Repair of defects and defective work prior to installation
  7. Cleaning
  8. Installation of polished floor finishes.
  9. Application of liquid hardener, densifier.
  10. Protection of finished surfaces after installation.
- C. Convene a minimum of two weeks before starting work of this section.

1.09 WARRANTY

- A. Time Period: Warrant that the Polished Concrete Floor will maintain its luster and overall appearance with reasonable cleaning for (36) months from date of Final Acceptance.
- B. Repairs:
1. Repair unsatisfactory conditions promptly at no additional cost to the Owner.
  2. Emergency repairs may be made by the Owner without relieving the Contractor of his warranty obligations.
  3. Delays of more than 30 days for repair work will allow the Owner to proceed with such repairs at the Contractor's expense.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Ensure manufacturer has minimum 5 years experience in manufacturing components similar to or exceeding requirements of project.

2.02 PRODUCTS/SYSTEM

- A. Manufacturer: L & M Construction Chemicals, Inc., 14851 Calhoun Rd., Omaha, NE 68152-1140; Telephone: (800) 362-3331, (402) 453-6600; Fax: (402) 453-0244; website: www.LMCC.com or alternate manufacturer approved by Architect prior to bidding:
- B. Products/Systems:
1. Hardener, Sealer, Densifier: Proprietary, water based, odorless liquid, VOC compliant, environmentally safe chemical hardening solution leaving no surface film.
    - a. Basis of Design: L & M Construction Chemicals, Inc., FGS Hardener Plus.
  2. Joint Filler: Semi-rigid, 2-component, self-leveling, 100% solids, rapid curing, polyurea control joint and crack filler with Shore A 80 or higher hardness.
    - a. Basis of Design: L & M Construction Chemicals, Inc., Joint Tite 750.
  3. Oil Repellent Sealer: Ready to use, silane, siloxane and fluoropolymers blended water-based solution sealer, quick drying, low-odor, oil and water repellent, VOC-compliant and compatible with chemically hardened floors.
    - a. Basis of Design: L & M Construction Chemicals, Inc., Petrotex.
  4. Concrete Dyes: Fast-drying dye, packaged in premeasured units ready for mixing with VOC exempt solvent; formulated for application to polished cementitious surfaces.
    - a. Basis of Design: L & M Construction Chemicals, Inc., Vivid Concrete Dyes.
    - b. Color: As selected by Architect.

5. Cleaning Solution: Mild liquid concrete cleaner and conditioner containing wetting and emulsifying agents; biodegradable, environmentally safe and certified High Traction by National Floor Safety Institute (NFSI).
  - a. Basis of Design: L & M Construction Chemicals, Inc., FGS Concrete Conditioner.
6. Finish: Standard Medium gloss (MG-2), 800 grit.

### 2.03 SOURCE QUALITY CONTROL

- A. Ensure concrete finishing components and materials are from single manufacturer.

## PART 3 EXECUTION

### 3.01 MANUFACTURERS INSTRUCTIONS

- A. Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions.
- B. Use installers certified by the manufacturer.

### 3.02 EXAMINATION

- A. Site Verification of Conditions:
  1. Verify that concrete substrate conditions, which have been previously installed under other sections or contracts, are acceptable for product installation in accordance with manufacturer's instructions prior to installation of concrete finishing materials.
- B. Verify Concrete Slab Performance Requirements.
  1. Verify concrete is cured to 3500 psi strength.
  2. Verify concrete surfaces received a hard steel-trowel finish (3 passes) during placement.

### 3.03 PREPARATION

- A. Ensure that manufacturer's requirements for environmental conditions have been satisfied prior to installation. Verify that concrete has cured under appropriate conditions for the required amount of time and that slab has been exposed to climate-controlled conditions for the required length of time prior to installation.
- B. Ensure surfaces are clean and free of dirt and other foreign matter harmful to performance of concrete finishing materials.
- C. Examine surface to determine soundness of concrete for polishing.
- D. General Contractor to remove surface contamination.

### 3.04 INSTALLATION

- A. Floor Surface Polishing and Treatment:
  1. Provide polished concrete floor treatment in entirety of slab indicated by drawings. Provide consistent finish in all contiguous areas.
  2. Apply floor finish prior to installation of fixtures and accessories.
  3. Diamond polish concrete floor surfaces with power disc machine recommended by floor finish manufacturer. Sequence with coarse to fine grit using dry method.
    - a. Comply with manufacturer's recommended polishing grits for each sequence to achieve desired finish level. Level of sheen shall match that of approved mock-up.
    - b. Expose aggregate in concrete surface only as determined by approved mock-up.
    - c. All concrete surfaces shall be as uniform in appearance as possible.
  4. Dyed and Polished Concrete:
    - a. Locate demarcation line between dyed surfaces and other finishes.

- b. Polish concrete to final finish level.
  - c. Apply diluted dyes to polished concrete surface.
  - d. Allow dye to dry.
  - e. Remove residue with dry buffer; reapply as necessary for desired result.
5. Apply FGS Hardener Plus, Hardener, Densifier As Follows:
  - a. First coat at 250 ft<sup>2</sup>/gal (6.25 m<sup>2</sup>/L).
  - b. Second coat at 350 ft<sup>2</sup>/gal (8.75 m<sup>2</sup>/L).
  - c. Follow manufacturer's recommendations for drying time between successive coats.
6. Remove defects and re-polish defective areas.
7. Finish edges of floor finish adjoining other materials in a clean and sharp manner.

### 3.05 ADJUSTMENTS

- A. Polish to higher gloss those areas not meeting specified gloss levels per mock-up.
- B. Fill joints flush to surface.

### 3.06 OWNER ORIENTATION

- A. Upon completion and acceptance, the Polished Concrete Contractor shall instruct the Owner's maintenance personnel in the operation, maintenance of the polished concrete floor system. Furnish copies of all user guides, available parts lists, specifications, and information on trouble shooting.

### 3.07 CLEANUP

- A. Keep all areas of work clean, neat and orderly at all times.
- B. Clean up and remove all excess materials and debris from the entire work area prior to Final Acceptance.
- C. Sweep or vacuum floor thoroughly.
  1. Do not wash stained concrete until after time period recommended by manufacturer.
  2. Damp-mop floor to remove marks and soil.

### 3.08 PROTECTION

- A. Protect installed product from damage during construction.
- B. Protect with EZ Cover™ by McTech Corp., (866) 913-8363, [www.ezform.net](http://www.ezform.net), or comparable product.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Detergent cleaning of masonry surfaces.
- B. Replacement of masonry units.
- C. Blast cleaning of existing CMU surfaces.
- D. Repointing mortar joints.
- E. Repair of damaged masonry.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry: Brick and concrete masonry units; mortar and grout.
- B. Section 04 26 16 – Adhered Masonry Veneer.

1.03 REFERENCE STANDARDS

- A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week prior to commencing work of this section.
  - 1. Require attendance of parties directly affecting work of this section.
  - 2. Review conditions of installation, installation procedures, and coordination with related work.
- B. Scheduling:
  - 1. Perform cleaning and washing of masonry between the hours of 7am to 8pm only.
  - 2. Perform blast cleaning of masonry between the hours of 7am to 8pm only.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate setting details of stone. Detail shoring.
- C. Product Data: Provide data on cleaning compounds.
- D. Samples: Submit four samples of decorative block, face brick, and stone units to illustrate matching color, texture and extremes of color range.
- E. Manufacturer's Instructions: For cleaning materials, indicate special procedures, and conditions requiring special attention.

1.06 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
  - 1. Maintain one copy of each document on project site.
- B. Restorer: Company specializing in masonry restoration with minimum three years of documented experience.

1.07 MOCK-UP

- A. Restore and repoint an existing masonry wall area sized 8 feet long by 6 feet high; include in mock-up area instances of mortar, accessories, wall openings, and flashings.
- B. Clean a 10 ft by 10 ft panel of wall to determine extent of cleaning.
  - 1. Repeat, using different cleaning methods for up to three different panels.
- C. Locate where directed.
- D. Acceptable panel and procedures employed will become the standard for work of this section.

- E. Mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver masonry neatly stacked and tied on pallets. Store clear of ground with adequate waterproof covering.
- B. Store blast medium materials in manufacturer's packaging.

1.09 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.
- B. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
- C. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.
- D. Do not blast clean or use process creating dust, dirt, or debris, when wind is over 10 mph.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Restoration and Cleaning Chemicals:
  - 1. Diedrich Technologies, Inc; [www.diedrichtechnologies.com](http://www.diedrichtechnologies.com).
  - 2. HMK Stone Care System; [www.hmkstonecare.com](http://www.hmkstonecare.com).
  - 3. PROSOCO; [www.prosoco.com](http://www.prosoco.com).
  - 4. Substitutions: See Section 01 25 00 – Substitution Procedures.

2.02 CLEANING MATERIALS

- A. Cleaning Agent: Detergent type.
- B. Blasting Medium: water.

2.03 MORTAR MATERIALS

- A. Comply with requirements of Section 04 20 00.

2.04 MASONRY MATERIALS

- A. Brick: Section 04 20 00.
- E. Block: Section 04 20 00.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces to be cleaned are ready for work of this section.

3.02 PREPARATION

- A. Protect surrounding elements from damage due to restoration procedures.
- B. Carefully remove and store removable items located in areas to be restored, including fixtures, fittings, finish hardware, and accessories; reinstall upon completion.
- C. Separate areas to be protected from restoration areas using means adequate to prevent damage.
- D. Cover existing landscaping with tarpaulins or similar covers.
- E. Mask immediately adjacent surfaces with material that will withstand cleaning and restoration procedures.
- F. Close off adjacent occupied areas with dust proof and weatherproof partitions.

- G. Protect roof membrane and flashings from damage with 1/2 inch plywood laid on roof surfaces over full extent of work area and traffic route.
- H. When using cleaning methods that involve water or other liquids, install drainage devices to prevent runoff over adjacent surfaces unless those surfaces are impervious to damage from runoff.
- I. Do not allow cleaning runoff to drain into sanitary or storm sewers.

### 3.03 REBUILDING

- A. Cut out damaged and deteriorated masonry with care in a manner to prevent damage to any adjacent remaining materials.
- B. Support structure as necessary in advance of cutting out units.
- C. Cut away loose or unsound adjoining masonry as directed.
- D. Build in new units following procedures for new work specified in other section(s).
- E. Mortar Mix: Colored and proportioned to match existing work.
- F. Ensure that anchors are correctly located and built in.
- G. Install built in masonry work to match and align with existing, with joints and coursing true and level, faces plumb and in line. Build in all openings, accessories and fittings.

### 3.04 REPOINTING

- A. Perform repointing prior to cleaning masonry surfaces.
- B. Cut out loose or disintegrated mortar in joints to minimum 1/2 inch depth or until sound mortar is reached.
- C. Use hand tools only. Do not use power tools.
- D. Do not damage masonry units.
- E. When cutting is complete, remove dust and loose material with air jet.
- F. Premoisten joint and apply mortar. Pack tightly in maximum 1/4 inch layers. Form a smooth, compact concave joint to match existing.
- G. Moist cure for 72 hours.

### 3.05 CLEANING EXISTING MASONRY

- A. High Pressure Cold Water: Cold water blast with 400-600 psi pressure to surfaces indicated on drawings, providing uniform finish.
  - 1. Use a wide flange tip, never a pointed tip.
  - 2. Keep the tip at least 12 in. (305 mm) from the masonry surface.
  - 3. Direct the spray at a 45 degree angle to the wall; never perpendicular to the wall).

### 3.06 CLEANING NEW MASONRY

- A. Verify mortar is fully set and cured.
- B. Clean surfaces and remove large particles with wood scrapers, brass or nylon wire brushes.
- C. Scrub walls with detergent type cleaning agent solution using stiff brush. Thoroughly rinse and wash off cleaning solution, dirt and mortar crumbs using clean, pressurized water.

### 3.09 CLEANING

- A. Immediately remove stains, efflorescence, or other excess resulting from the work of this section.
- B. Remove excess mortar, smears, and droppings as work proceeds and upon completion.

MBI #230042.02  
ANDERSON COUNTY BID # 2521

SECTION 04 01 00  
MAINTENANCE OF MASONRY

C. Clean surrounding surfaces.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

- A. Masonry work, including brick, concrete block, precast masonry lintels, and all necessary incidental work.

1.02 RELATED DOCUMENTS

- A. Applicable provisions of the General Conditions, Supplementary Conditions, Division 1, General Requirements, and the following sections apply to the work under this section.
1. Section 07 62 00 - Sheet Metal Flashing and Trim.
  2. Section 07 92 00 – Joint Sealants.

1.03 QUALITY ASSURANCE

- A. Qualifications of workmen:
1. For the actual cutting and placing of concrete masonry units, use only skilled journeyman masons who are thoroughly experienced with the materials and methods specified and thoroughly familiar with the design requirements.
  2. In acceptance or rejection of installed concrete masonry units, no allowance will be made for lack of skill on the part of workman.
  3. Provide at least one (1) skilled journeyman mason who shall be present at all times during execution of the work of this Section and who shall personally direct the execution of this portion of the work.
- B. Masonry units exposed to view shall be obtained from a single manufacturer; each type of product shall be from a single batch or production run.
- C. Cementitious ingredients of mortar mix shall be obtained from a single manufacturer. Each aggregate for mortar mix shall be obtained from a single source.
- D. Comply with applicable portions of the American Society for Testing and Materials (ASTM) Applicable codes and regulations of authorities having jurisdiction.

1.04 SUBMITTALS

- A. Submit manufacturer's product data for each type of masonry unit, accessory and other manufactured products, including certifications that each type complies with specified requirements.

1.05 SAMPLES

- A. Contractor shall have verification in writing from the Architect which brick is to be used prior to ordering brick.
- B. ***Before any exterior facebrick is laid up***, the Contractor shall erect a sample panel, including concrete block backup, air barrier, flashing, insulation, mortar netting and mortar, approximately 4 feet wide by 4 feet high. When approved, the panel shall be left in place until facebrick work is completed to serve as a standard for all work. At Architect's option, one corner of the building may be used as a sample panel.
- C. Protect the sample panel from the elements with weather resistant membrane. Retain approved sample panel during construction as a standard for judging completed masonry work. When directed, demolish sample panel and remove debris from site.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver masonry materials in undamaged condition. Handle masonry units to prevent damage. Store in a manner to protect against excessive moisture, temperature changes, contaminants, corrosion or other causes. Limit absorption of moisture as specified for Type I units.
- B. Deliver cementitious materials in manufacturers' original, unopened containers.
- C. Store cementitious materials above ground, under cover and in dry enclosure.
- D. Store aggregates so that separation of types of materials can be maintained.
- E. Protect masonry accessories from corrosion and accumulation of dirt.

1.07 PROJECT CONDITIONS

- A. Protect exposed masonry work against staining and mortar droppings. Keep top of walls covered with non-staining waterproof paper or plastic sheet when work is not in progress and during precipitation of rain or snow. When work is resumed, clean top surface of walls free of loose mortar and in dry weather wet the surface before proceeding.
- B. Turn scaffolding plank every night and when wet to prevent spattering mortar on face of walls.
- C. Do not superimpose any load to masonry work for 12 hours after erection. Allow 3 days before applying concentrated loads.
- D. Cold Weather Protection:
  - 1. Remove ice or snow from masonry bed by applying eat until top surface is dry to touch.
  - 2. Remove all frozen or damaged masonry work.
  - 3. Do not use wet or frozen units or units. Units must be minimum of 20°F (-7°C) when laid.
  - 4. Never allow mortar to freeze
- E. Construction Requirements While Work is Progressing:
  - 1. For all air temperatures below 40°F (4°C), heat sand or mixing water to produce mortar temperatures between 40°F (4°C) and 120°F (49°C).
  - 2. Additionally, for all air temperatures below 25°F (-4°C), provide heat sources on both sides of wall during construction AND provide windbreaks when wind exceeds 15 mph.
  - 3. Additionally, for all air temperatures 20°F (-7°C) and below, provide enclosures and heat to maintain air temperature above 32°F (0°C).
- F. Protection requirements for completed work:
  - 1. Mean daily air temperature: 40°F (4°C) to 32°F (0°C):
    - 1. Protect masonry from rain or snow with weather-resistive covering for 24 hours.
  - 2. Mean daily air temperature: 32°F (0°C) to 25°F (-4°C).
    - 1. Completely cover masonry with weather-resistive covering for 24 hours.
  - 3. Mean daily air temperature: 25°F (-4°C) to 20°F (-7°C).
    - a. Completely cover masonry with insulating blankets or equal protection for 24 hours.
  - 4. Mean daily air temperature: 20°F (-7°C) and below.
    - a. Maintain masonry temperature above 32°F (-7°C) for 24 hours by using enclosures and supplementary heat or with electric heating blankets.

## PART 2 PRODUCTS

### 2.01 MASONRY MATERIALS

- A. Field face brick shall be or match the following:
1. Watson Town Brick - Red Wire Cut Flash as manufactured by General Shale Brick of Knoxville, Tennessee.
- B. Accent face brick shall be or match the following:
1. Watson Town Brick – Light Grey Wire Cut, as manufactured by General Shale Brick of Knoxville, Tennessee
- C. Face brick exposed on the exterior and interior of building shall be Utility size - 11-5/8" x 3-3/4" x 3 5/8" to lay up 2 courses in 8". Range of color shall be uniformly distributed in brick as delivered.
- D. Face brick to be used in exposed locations shall conform to the requirements of ASTM C216 Grade SW and shall be Type FBS.
- E. In locations where the cores of cored brick would be exposed use solid brick with finished faces and ends as required to present a finished face on the exposed face.
- F. Brick in concealed locations shall be culled face brick or all hard-burned common brick, conforming to ASTM C62-75A, Grade SW.
- G. Concrete block shall be hollow load-bearing concrete masonry units, conforming to ASTM C 90-75, Grade N-1, made with Shalite, or equal, light-weight aggregate. Units shall be steam cured at atmospheric pressure for not less than 12 hours at temperatures between 160 and 190 degrees F., and then shall be air dried and cured at least 28 days. When delivered to the site, units shall have a moisture content of not more than specified in ASTM C 90-75.
1. Units generally shall be 8" x 16" nominal face size and thicknesses shown on the drawings. Furnish all special sizes, lintel blocks and other special shapes required by job conditions.
    - a. Precast U-Lintels and special shapes made from 3,500 psi concrete with reinforcing bars placed as indicated and filled with coarse grout shall be acceptable upon review and approval by the Structural Engineer of Record. Units shall have a sand block finish to match adjacent CMU.
    - b. Basis of Design: Precast concrete u-lintels are based on products manufactured by Cast Crete. Subject to compliance with requirements.
  2. All exterior corners of interior masonry walls to be exposed to view shall be made with bull-nose (radius edge) block.
  3. Any split face and/or smooth face block used on the exterior of the building and exposed to view shall be cast with integral color. Architect shall select color from manufacturer's full range or will indicate an existing condition to be matched or will provide a physical sample for color-matching purposes. Color will not be white.
  4. All block to be used on the exterior of the building shall be cast with integral waterproofing agent similar and equal to Acme Shield or Grace Industries "Dry Block System".
- H. Where it is necessary to cut masonry, use an approved masonry saw. Use no units less than half size. Promptly remove units showing evidence of being broken and replace with properly cut units.

### 2.02 REINFORCING MATERIALS

- A. Masonry wall reinforcing for all masonry walls and partitions shall be Dur-O-Wall ladder design, Heckmann, Hohmann and Barnard, Wire-Bond or approved equal, and shall have product approval of the International Building Code Congress. Reinforcing shall be manufactured from cold drawn steel wire conforming to ASTM A 8272 and shall consist of two deformed longitudinal rods welded at 16" intervals

to a continuous diagonal cross rod forming a truss design. Out-to-out spacing of side rods shall be approximately 2" less than the nominal thickness of the wall or partition. Cross rods and side rods shall be not less than No. 9 gauge.

1. Reinforcing for CMU walls shall be Dur-O-Wall DA 320.
2. Reinforcing for use with brick veneer at C.M.U. walls shall be Dur-O-Wall D/A 360 Ladur-Eye or equal spaced 16 inches on center each way.
3. Brick ties at metal stud framing shall be Dur-O-Wall D/A 213 with 14 gauge screw on plate and 3/16" pintles at 16" on center, each way.
4. Interior walls: reinforcement shall be galvanized in accordance with ASTM A 641 Class 1 (.4 ounces per square foot.)
5. Exterior walls reinforcement shall be galvanized in accordance with ASTM A 153 Class B2 (1.5 ounces per square foot).
6. When ordering cavity wall reinforcing, the Contractor must specify the CMU thickness, Cavity Wall Insulation thickness if any, the cavity width, and the Brick Thickness.

## 2.03 MORTAR MATERIALS

- A. Portland Cement shall conform to ASTM C150, Type 1. Masonry cement shall conform to ASTM C91, and shall be equal to Cemex, Essroc Italcementi Group, Holcim, or Lafarge North America. Hydrated lime shall conform to ASTM C207, Type S.
- B. Aggregate for mortar shall be natural or manufactured sand conforming to ASTM C 144; except for joints less than 1/4" thick, use aggregate graded with 100 percent passing the No. 16 sieve and shall be uniform in color for all masonry work.
- C. Mixing water shall be clean and free from harmful amounts of acids, alkalies, and organic materials.
- D. Mortar shall conform to requirements of ASTM C270. Mortar for masonry work below grade shall be one part Portland Cement, 1/4 part hydrated lime or lime putty, and not less than 2-1/4 nor more than 3 parts sand, by volume, or any other mix conforming to ASTM requirements for Type M or Type S mortar. Mortar for masonry work above grade shall be one part masonry cement to not less than 2-1/4 nor more than 3 parts sand, by volume, or any other mix conforming to ASTM requirements for Type S or Type N mortar.
- E. Sand for mortar shall be measured in a damp loose condition. Mix mortar with the maximum amount of water consistent with satisfactory workability for a minimum of 3 minutes in a drum type mechanical mixer. Mixer shall be thoroughly cleaned between batches. Water may be added to mortar to maintain workability. No mortar older than 1 hour shall be used..
- F. Colored mortar for use with face brick shall contain colored masonry cement similar and equal to Brixment as manufactured by Cemex, Essroc Italcementi Group, Holcim, or Lafarge North America.
  1. Color of mortar to be or match – Holcium color Frosty

## 2.04 CAVITY DRAINAGE SYSTEM

- A. Provide mortar/drainage netting at base of brick veneer cavities in size to completely fill width of cavity. Mortar netting shall be manufactured using recycled polyester or polyethylene. The following are acceptable products, alternate products must be approved prior to bidding:
  1. Mortar Net as manufactured by Mortar Net USA, LTD.
  2. Mortar Break as manufactured by Advanced Building Products, Inc.
  3. Driwall Mortar Deflection as manufactured by Keene Building Products
- B. Provide Weep Vents in masonry veneer over cavity at 24 inches on center and at the base of all cavity walls above flashing and above and below window and door openings above thru-wall flashing and as shown on

the drawings. Weep Vents shall be 2-5/8 inch by 3 1/2 inch by 1/2 inch recycled polyester mesh. The following are acceptable products, alternate products must be approved prior to bidding:

1. Weep Vents as manufactured by Mortar Net USA LTD.
2. Cell Vent as manufactured by Advanced Building Products, Inc.
3. Weep Vents 025 as manufactured by Keene Building Products

## 2.05 CONTROL JOINTS

- A. "Wal-Joint", wide flange type, as manufactured by Hohmann & Barnard, Inc., approved equals of Dur-o-wall, Carter-Waters, Tywal Accessories, or Vinyl's are acceptable.
- B. Provide vertical control joints in all masonry walls that exceed 32'-0" in length and/or exceed a ratio of panel length to height (L/H) of 3.
- C. All joint locations must be verified and approved by the Architect. Control joints shall not be placed above or at the side of a masonry opening except where necessary to separate masonry supported off the foundation from that supported from the structure.
- D. Steel lintels supporting masonry shall be discontinuous at control joints & expansion joints.

## 2.06 EXPANSION JOINTS IN BRICK VENEER

- A. Provide vertical expansion joints in brick veneer walls at thirty-five feet (35'-0") on center maximum.

## PART 3 EXECUTION

### 3.01 COORDINATION WITH OTHER WORK

- A. Coordinate with other trades to insure that they have ample opportunity to build in their work as the masonry work progresses. Build in frames, anchors, and other incidental items furnished under other sections of the specifications. Set loose steel lintels and construct chases and recesses as required. Verify dimensions and locations of anchors, chases, etc., with the other trades involved.
- B. Build in through wall flashing as masonry is laid ensuring laps at ends and end dams at end of flashing above and below openings.
- C. Coordinate the masonry work for reinforced masonry block brick walls closely with the installation of the concrete fill and steel reinforcement.
- D. Furr out around piping and electrical panels and other items wherever the existing wall or proposed walls are not thick enough to accommodate items that are scheduled to go in them.
- E. In the event of discrepancy, immediately notify the Architect. Do not proceed with installation in areas of discrepancy until all such discrepancies have been completely resolved.

### 3.02 TOLERANCES FOR CONSTRUCTION

- A. Bed joints and head joints shall be nominal 3/8" thick with slight variations allowed (5/16" to 7/16") to adjust coursing and to avoid cutting. Standard coursing for brick: 3 bricks and 3 mortar joints shall equal 8 inches unless otherwise noted.
- B. Variation from the plumb in the lines and surfaces of columns, walls, and arises shall not exceed 1/8" in 10' and 3/8" in a story height or 3/8" in 20'-0" maximum. Variation from plumb for external corners, expansion joints and other conspicuous lines, shall not exceed 1/4" in any story or 1/4" in 20'-0" maximum.

- C. Variation from the level of the grades indicated on the Drawings for exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines shall not exceed 1/4" in any bay or module or 20'-0" (whichever dimension is the least) nor 1/2" in 40'-0" or more.
- D. Variation of the linear building line from an established position in plan and related portion of columns, walls, and partitions shall not exceed 1/4" in any bay or module or 20'-0" (whichever dimension is the least) nor 3/4" in 40'-0" or more.
- E. Variation in cross-sectional dimensions of columns and thickness of walls shall not exceed minus 1/4", nor plus 1/2" from the dimensions indicated on the Drawings.

### 3.03 CAVITIES

- A. Keep cavities clean of mortar droppings and other materials during construction.
  - 1. Install Cavity Drainage Material in cavities in accordance with manufacturer's recommendations.
  - 2. Use wood strips temporarily placed in cavity to collect mortar droppings. As work progresses, remove strips, clean off mortar droppings, and replace in cavity.
- B. Install Weep Vents at 24 inches on center at the base of wall cavities, above and below window openings above thru wall flashing and elsewhere as shown on the drawings.
- C. Installing Cavity-Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
  - 1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

### 3.04 LAYING BRICK

- A. Wet brick prior to laying unless their gain in weight is less than 3/4 oz. when immersed in 1/4" of water for one minute. Lay in full bed of slightly furrowed mortar and fill head joints completely.
- B. Lay facebrick on exterior walls in running bond and anchor to backup and to inner wythe with steel masonry reinforcing.
- C. Concealed brickwork 8" or more thick shall be laid in English bond with every other course of full headers.
- D. Brick veneer shall be returned against CMU or sheathing at all openings in exterior wall as required to close cavity.

### 3.05 LAYING CONCRETE BLOCK

- A. Lay with full mortar coverage on vertical and horizontal face shells. Vertical joints in exposed concrete block work shall break at center of stretcher above and below; otherwise, bond each course at corners and intersections and break vertical joints at least 4".
- B. Broken or split block shall not be used. All cutting required shall be done with a masonry saw. The mortar bedding for anchors for door bucks and frames shall be spread on strips of 1/8" mesh hardware cloth about 12" long.
- C. Install steel masonry reinforcing in all concrete block walls and partitions. Partitions abutting exterior walls shall be anchored thereto with steel masonry reinforcing unless otherwise noted.
- D. Partitions enclosing pipe and duct chases shall be built after the piping and ducts are in place and have been tested and approved.

- E. All partitions shall extend from concrete floor slabs to underside of roof deck except where specifically noted or shown otherwise. All partitions shall be not less than 1-hour fire-resistive construction and the concrete blocks shall be UL listed or shall conform to requirements of the Building Code adopted by the authority having jurisdiction for 1-hour fire-resistance.
- F. Provide centering and install bond beam block over all openings greater than 24" wide in concrete walls and partitions, including openings for panelboards, ducts, and grills. Extend bond beams 8 inches minimum beyond edge of opening each side. Reinforce bond beams as noted on the drawings or with a minimum of 1 #5 bar top and bottom if not noted on the drawings. Fill Bond beams with concrete before laying next course of block.
- G. Install spandrel blocks for bond beams at the top of all masonry walls unless noted otherwise.
- H. Where masonry is to be exposed in the interior of a building the mortar joint at the intersection of interior masonry wall with exterior masonry wall shall be raked ¼ inch deep and caulked.

### 3.06 FLASHING

- A. Place flashing in masonry work on a bed of mortar. Cover flashing with bed of mortar before placing units on flashing. Do not puncture flashing. Join sections of flashings by overlapping 6 inches minimum and fastening with adhesive to provide watertight joints. Turn up ends of flashing to provide positive drain to exterior. Comply with flashing manufacturer's recommendations. Install thru-wall flashings where shown on the drawings and in the following locations:
  - 1. Above all openings in exterior walls extend 12" beyond opening.
  - 2. Above all intersections of floors and exterior walls.
  - 3. Above all intersections of roofs with parapet walls, penthouses and all other exterior walls.
  - 4. Weep holes shall be installed above thru-wall flashings.

### 3.07 WORKMANSHIP

- A. Masonry work shall be sound, straight, true, and complete in every respect, and exterior walls shall be so constructed as to preclude the penetration of water. Avoid over-plumbing and pounding of masonry units after they are set in place; where adjustments must be made after mortar has started to set, the mortar shall be removed and replaced with fresh mortar.
- B. Joints shall be thickness to conform to coursing specified or shown and shall be uniform and bond shall be true.
- C. Hollow metal door frames in masonry walls shall be filled solidly with mortar as the walls are laid up, but forming a cavity behind rubber bumper opening with a wad of newspaper. Unless otherwise specifically shown or specified, the space around anchors, flashing, steel lintels, and similar items built into the masonry work shall be filled solidly with mortar.
- D. Where nails or line pins have been used, they shall be removed when they have served their purpose and the holes left by their removal shall be filled immediately with fresh mortar.

### 3.08 POINTING

- A. After masonry work is completed, remove all line pins and point up all holes and open joints.

### 3.09 TOOLING

- A. Tool all joints concave unless otherwise noted. Joints in exposed faces of facebrick on exterior and concrete block on interior shall be tooled with a round steel jointer, except at changes in brick color, just before the mortar hardens, with sufficient force to press the mortar against the masonry units on each side of the joint.

- B. Joints where brick changes color shall be raked joints. Face joints in concealed locations shall be struck flush
- C. Cut joints flush in block surfaces which will be concealed in the finished work or to which a finish material (other than paint) shall be supplied.

3.10 CLEANING OF MASONRY

- A. Face of brick work shall be kept clean of mortar droppings, stains, and soil as the work progresses insofar as possible. The completed work shall be cleaned by methods approved by the Architect, equivalent to the following:
  - 1. Cleaning shall not be started until mortar is thoroughly set and cured. Then surfaces shall be dry cleaned by removing large particles of mortar with wood paddles and scrapers, using a chisel or wire brush where necessary.
  - 2. Presoak wall by saturating the masonry with clean water and flush off all loose mortar and dirt.
  - 3. While the surface is still saturated, starting at top of wall, scrub down with a solution mixed in the proportions of one-half cup of trisodium phosphate (Calgon) and one-half cup household detergent (All) dissolved in one gallon of clean water. Scrub with stiff fiber brushes only. Keep wall area below work area wet down at all times.
  - 4. After scrubbing thoroughly, rinse off all cleaning solution, dirt and mortar crumbs, using pressurized water from a hose.
- B. In areas where the preceding procedure is not adequate, use a similar procedure, but substitute an acid solution instead of the cleaner solution for scrubbing. Acid solution shall be mixed one part clean, stain-free commercial grade of hydrochloric (Muriatic) acid to nine parts clean water, mixed in a non-metallic container. Keep all brick work below the area being cleaned, soaked and flush free of acid and dissolved mortar before it becomes dry. Do not use wire brushes or metal tools and do not allow acid solution to come in contact with any metal or cast stonework. Acid solution shall be used only as a last resort and where expressly permitted by the Architect.
- C. Exposed concrete block surfaces shall be kept clean of mortar droppings as the work progresses and the completed work shall be dry-cleaned to remove remaining mortar spots and dirt. Surface shall be brushed free of dust before painting.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Thin Brick.
- B. Mortar.
- C. Air and Water Barrier.
- D. Accessories.

1.02 RELATED SECTIONS

- A. Section 04 01 00 - Maintenance of Masonry.
- B. Section 07 62 00 - Sheet Metal Flashing and Trim: Through-wall masonry flashings.
- C. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCES

- A. American National Standards Institute – ANSI:
  - 1. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar.
  - 2. ANSI A118.10 – American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-set Ceramic Tile and Dimension Stone Installation.
  - 3. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation.
- B. ASTM International:
  - 1. ASTM C91/C91M - Standard Specification for Masonry Cement.
  - 2. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 50 mm [2 in.] Cube Specimens).
  - 3. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
  - 4. ASTM C627 – Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester.
  - 5. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.
  - 6. ASTM C847 - Standard Specification for Metal Lath.
  - 7. ASTM C1088 - Standard Specification for Thin Veneer Brick Units Made From Clay or Shale.
  - 8. ASTM D751 - Standard Test Methods for Coated Fabrics.
  - 9. ASTM D4068 – Standard Specification for Chlorinated Polyethylene (CPE) Sheeting for Concealed Water-Containment Membrane.
- C. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation.

1.04 ADMINISTRATIVE REQUIREMENTS

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

1.05 SUBMITTALS

- A. Submit shop drawings and manufacturers' product data under provisions of Section 01 30 00.
- B. Submit samples of each type/style/finish/size/color of ceramic tile, thin brick, manufactured masonry veneer, mosaic, and trim unit under provisions of Section 01 30 00.
- C. Submit manufacturers' installation instructions under provisions of Section 01 30 00.
- D. Manufacturer's Certificate: Certify that thin brick units, adhesives, mortar, and grout meet or exceed specified requirements.
- E. Submit proof of warranty.
- F. Submit sample of installation system demonstrating compatibility/functional relationships between adhesives, mortars, grouts and other components under provision of Section 01 30 00. Submit proof from masonry veneer

manufacturer or supplier verifying suitability of veneer for specific application and use; including dimensional stability, water absorption, freeze/thaw resistance, resistance to thermal cycling, and other characteristics the project may require.

**1.06 QUALITY ASSURANCE**

- A. Tile Manufacturer (single source responsibility): Company specializing in ceramic tile, thin brick, manufactured masonry veneer, mosaic, and trim unit with three (3) years minimum experience. Obtain thin brick from a single source with resources to provide products of consistent quality in appearance and physical properties.
- B. Installation System Manufacturer (single source responsibility): Company specializing in adhesives, mortars, grouts and other installation materials with ten (10) years minimum experience and ISO 9001 certification. Obtain installation materials from single source manufacturer to insure consistent quality and full compatibility.
- C. Submit laboratory confirmation of adhesives, mortars, grouts and other installation materials:
  - 1. Identify proper usage of specified materials using positive analytical method.
  - 2. Identify compatibility of specified materials using positive analytical method.
  - 3. Identify proper color matching of specified materials using a positive analytical method.
- D. Installer qualifications: company specializing in installation of ceramic tile, thin brick, manufactured masonry veneer, mosaic, and trim unit with five (5) years documented experience with installations of similar scope, materials and design.

**1.07 MOCK-UPS**

- A. Construct a mock-up panel sized four feet long by four feet high; include mortar, grout, adhesives, accessories, substrate, and representative wall openings in mock-up.
- B. Locate where directed.
- C. Architect-approved mock-up may remain as part of the Work.

**1.08 PRE-INSTALLATION CONFERENCE**

- A. Pre-installation conference: At least three weeks prior to commencing work attend a meeting at the jobsite to discuss conformance with requirements of specification and job site conditions. Representatives of owner, architect, general contractor, tile subcontractor, Tile Manufacturer, Installation System Manufacturer and any other parties who are involved in the scope of this installation must attend the meeting.

**1.09 DELIVERY, STORAGE, AND HANDLING**

- A. Acceptance at Site: Deliver and store packaged materials in original containers with seals unbroken and labels, including grade seal, intact until time of use, in accordance with manufacturer's instructions.
- B. Store veneers and installation system materials in a dry location; handle in a manner to prevent chipping, breakage, and contamination.
- C. Protect latex additives, organic adhesives, epoxy adhesives and sealants from freezing or overheating in accordance with manufacturer's instructions; store at room temperature when possible.
- D. Store Portland cement mortars and grouts in a dry location.
- E. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

**1.10 FIELD CONDITIONS**

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
- B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

1.11 SEQUENCING AND SCHEDULING

- A. Coordinate installation of adhered masonry work with related work.
- B. Proceed with adhered masonry work only after curbs, vents, drains, piping, and other projections through substrate have been installed and when substrate construction and framing of openings have been completed.

1.12 WARRANTY

- A. The manufacturer of adhesives, mortars, grouts and other installation materials shall provide a written twenty five (25) year warranty, which covers materials and labor.

1.13 EXTRA MATERIALS STOCK

- A. Upon completion of the work of this Section, deliver to the Owner 2% minimum additional thin brick and trim shape of each type, color, pattern and size used in the Work, as well as extra stock of adhesives, mortars, grouts and other installation materials for the Owner's use in replacement and maintenance. Extra stock is to be from same production run or batch as original tile and installation materials.

PART 2 PRODUCTS

2.01 THIN BRICK

- A. Manufacturers:
  - 1. Basis of Design: General Shale Brick; [www.generalshale.com](http://www.generalshale.com).
  - 2. Substitutions: 01 25 00 - Substitution Procedures.
- B. Thin Brick: ASTM C1088.
  - 1. Type: TBX.
  - 2. Size: Manufacturer's standard Modular.
  - 3. Thickness: 5/8 inch.
  - 4. Tolerances: 1/16 inch.
  - 5. Color, Texture, Range, Special Shapes: As selected by MBI Companies from manufacturer's standard range of colors, textures and blends.

2.02 INSTALLATION MATERIALS

- A. Manufacturers:
  - 1. Basis of Design: LATICRETE International, Inc; LATICRETE MVIS Hi-Bond Mortar: [www.laticrete.com](http://www.laticrete.com).
  - 2. Mapei Corporation; [www.mapei.com](http://www.mapei.com).
  - 3. Substitutions: 01 25 00 - Substitution Procedures.

2.03 INSTALLATION ACCESSORIES

- A. Bulk Water Management / Crack Suppression Membrane: Basis of Design – Laticrete MVIS WCI.
  - 1. Thin, cold applied, single component liquid and load bearing.
  - 2. Reinforcing fabric to be non-woven rot-proof specifically intended for waterproofing membrane.
  - 3. Waterproofing Membrane to be non-toxic, non-flammable, and non-hazardous during storage, mixing, application and when cured.
  - 4. It shall also meet the following physical requirements:

a. Hydrostatic Test (ASTM D4068):	Pass
b. Elongation @ break (ASTM D751):	20-30%
c. System Crack Resistance (ANSI A118.12):	Pass (High)
d. 7 day Tensile Strength (ANSI A118.10):	>265 psi (1.8 MPa)
e. 7 day Shear Bond Strength (ANSI A118.10)	>200 psi (1.4 MPa)
f. 28 Day Shear Bond Strength (ANSI A118.4):	>214 psi (1.48 – 2.4 MPa)
g. Service Rating (TCA/ASTM C627):	Extra Heavy
h. Total VOC Content:	< 0.05 mg/m3
- B. Epoxy Waterproofing Membrane/Flashing Mortar: Basis of Design – Latapoxy Waterproof Flashing Mortar.
  - 1. Three component epoxy, trowel applied specifically designed to be used under masonry veneer, stone or thin brick and requires only 24 hours prior to flood testing:

- a. Breaking Strength (ANSI A118.10): 450-530 psi (3.1-3.6 MPa)
  - b. Waterproofness (ANSI A118.10): No Water penetration
  - c. 7 day Shear Bond Strength (ANSI A118.10): 110-150 psi (0.8-1 MPa)
  - d. 28 Day Shear Bond Strength (ANSI A118.10): 90-120 psi (0.6-0.83 MPa)
  - e. 12 Week Shear Bond Strength (ANSI A118.10): 110-130 psi (0.8-0.9 MPa)
  - f. Total VOC Content: <3.4 g/L
- C. Latex Portland Cement Mortar: Basis of Design – Laticrete MVIS Lite Wall Float.
  - 1. For thick beds, and scratch/plaster coats to be weather, frost, shock resistant and meet the following physical requirements:
    - a. Compressive Strength (ASTM C109): >2000 psi (13.8 MPa)
    - b. Total VOC Content: < 0.05 mg/m<sup>3</sup>
- D. Latex Portland Cement Thin Bed Mortar: Basis of Design – Laticrete MVIS Veneer Mortar.
  - 1. Compressive strength (ASTM C270): ≥2900 psi (20 MPa)
  - 2. Shear bond strength (ANSI A118.4 5.2.4): ≥300 psi (2.1 MPa)
  - 3. Sag On Wall (EN 1308): 0.0mm
  - 4. Total VOC Content: < 0.05 mg/m<sup>3</sup>
- E. Latex Portland Cement Pointing Mortar: Basis of Design – Laticrete MVIS Pointing Mortar.
  - 1. Weather, frost and shock resistant, as well as meet the following physical requirements:
    - a. Compressive Strength (ASTM C91): ≥3000 psi (20.7 MPa)
    - b. Total VOC Content: < 0.05 mg/m<sup>3</sup>
- F. Expansion and Control Joint Sealant: Basis of Design – Laticrete Latasil.
  - 1. One component, neutral cure, exterior grade silicone sealant and meet the following requirements:
    - a. Tensile Strength (ASTM C794): 280 psi (1.9 MPa)
    - b. Hardness (ASTM D751; Shore A): 25 (colored sealant) /15 (clear sealant)
    - c. Weather Resistance (QUV Weather-ometer): 10,000 hours (no change)
- G. Flashing Sealant Material: Basis of Design – MVIS Flashing Sealant.
  - 1. Specifically designed for flashing transitions and compatibility to adhered veneer systems.
- H. Sealer (Exterior Masonry Veneers): Basis of Design – Laticrete Stonetech Heavy Duty Exterior Sealer.
  - 1. Water-based formula specifically designed for topical application on porous stones in exterior applications.
- I. Galvanized, diamond metal lath:
  - 1. Flat expanded type, weighing not less than 3.2 lb. per yd<sup>2</sup> (1.4 kg/m<sup>2</sup>).
  - 2. Metal lath shall comply with ASTM C847.

### PART 3 EXECUTION

#### 3.01 SUBSTRATE EXAMINATION

- A. Verify that surfaces to be covered with ceramic tile, mosaic, masonry veneer, trim unit, and waterproofing are:
  - 1. Sound, rigid and conform to good design/engineering practices.
  - 2. Systems, including the framing system and panels, over which ceramic tile will be installed shall be in conformance with the International Building Code (IBC) for commercial applications, or applicable building codes.
  - 3. Clean and free of dust, dirt, oil, grease, sealers, curing compounds, laitance, efflorescence, form oil, loose plaster, paint, and scale.
  - 4. Not leveled with gypsum or asphalt based compounds.
- B. Advise General Contractor of any surface or substrate conditions requiring correction before thin brick work commences. Beginning of work constitutes acceptance of substrate or surface conditions.

#### 3.02 INSTALLATION

- A. Exterior Adhered Veneers: Use the following system materials – Laticrete MVIS Veneer Mortar:

1. Moisten the back of each veneer unit and the top of the scratch coat so the surfaces appear damp but are free of standing water.
2. Install masonry veneer adhesive mortar in compliance with current revisions of Masonry Veneer Manufacturer's Association (MVMA) "Installation Guide for Adhered Concrete Masonry Veneer" and/or veneer manufacturer's specific written installation instructions.
3. Use the appropriate installation tools to ensure proper bedding of veneer unit. Work the masonry veneer adhesive mortar into good contact with the back of the veneer unit making sure the entire unit is buttered to a nominal 1/2" (12mm) thickness. DO NOT COVER JUST THE PERIMETER! Buttered masonry veneer units should be firmly worked onto the scratch coat and slid slightly back and forth or with a slight rotating motion.
4. Allow installation to set until firm. Clean excess latex Portland cement mortar from masonry veneer or stone face and joints between pieces.
5. Tight fitted masonry veneer should be applied from the corners toward the middle of the wall, and from the bottom toward the top of the wall.

### 3.03 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Brick Units:
  1. Bond: As indicated on drawings.
  2. Coursing: Three units and three mortar joints to equal 8 inches.
  3. Mortar Joints: Concave.

### 3.04 PLACING AND BONDING

- A. Remove excess mortar as work progresses.
- B. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove and replace.
- C. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

### 3.05 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
- B. Extend metal flashings through exterior face of masonry and turn down to form drip.
- C. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.

### 3.06 CONTROL AND EXPANSION JOINTS

- A. Form joints as detailed on drawings.

### 3.07 TOLERANCES

- A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- B. Maximum Variation from Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.
- C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- D. Maximum Variation from Level Coursing: 1/8 inch in 3 feet and 1/4 inch in 10 feet; 1/2 inch in 30 feet.
- E. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.

### 3.08 CUTTING AND FITTING

- A. Cut and fit for pipes and conduit. Coordinate with other sections of work to provide correct size, shape, and location.

3.09 CLEANING

- A. Remove excess mortar and mortar smears as work progresses.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.

3.10 PROTECTION

- A. Keep finished work undisturbed until full cure. Suitable protection is to be included in the scope of work.
- B. Each component must reach a proper cure prior to installing the subsequent installation product.
- C. Tent / shade and heat areas that will be subjected to the elements, or freezing temperatures, during installation and cure periods.
- D. Protect newly installed exterior adhered veneer installations from direct exposure to rain for 7 days at 70 degrees Fahrenheit / 21 degrees Celsius. Protection and corrective action primarily requires temporary enclosures or tarpaulins prior to, during, and immediately after installation to shield from rain. If prolonged exposure occurs, surfaces that appear dry may be saturated internally and require testing to determine suitability of certain overlay substrates, membranes, and adhesives. Protection applies to the substrate, the installation of adhesives and joint grouts, post-installation (rain and temperature protection) until suitable cure, and also the storage and handling of the cladding material.
- E. Replace, or restore, work of other trades damaged or soiled by work under this section.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

- A Furnish all material, labor, equipment, and supervision required to provide, fabricate, and install the following:

1. Structural steel framing members.
2. Baseplates and anchor plates.
3. Grouting under baseplates.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1. Section 05 50 00 – Metal Fabrications: For steel lintels or shelf angles not attached to structural-steel frame; miscellaneous steel fabrications; and other metal items not defined as structural steel.

1.03 PERFORMANCE REQUIREMENTS

- A Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand ASD-service loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using schematic details indicated and AISC's "Manual of Steel Construction"
  - a. Construction: Type 1, rigid frame and 2, simple framing.

1.04 SUBMITTALS

- A Submit under provisions of Section 01 30 00.

- B Shop Drawings:

1. Indicate profiles, sizes, spacing, and locations of structural members, openings, attachments and fasteners.
2. Connections.
3. Indicate welded connections with AWS A2.0 welding symbols. Indicate net weld lengths.

- C Manufacturer's Mill Certificate: If requested by the Engineer, submit under provisions of Section 01 40 00 and Section 01 45 00 certifying that products meet or exceed specified requirements.

- D Mill Test Reports: If requested by the Engineer, submit under provisions of Section 01 40 00, Manufacturer's Certificates, indicating structural strength, destructive and nondestructive test analysis.

- E Welders' Certificates: If requested by the Engineer, submit under provisions of Section 01 40 00 Manufacturer's Certificates, certifying welders employed on the Work, verifying AWS qualifications within the previous 12 months.

- F Inspection test reports: Inspecting agency shall provide reports of tests conducted. Test results shall be reported to the Architect and Contractor in writing on the same day that the test is made. All tests reports indicating non-compliance should be faxed immediately to all parties on the test report distribution list.

1. Reports shall contain the project identification name and number, date of test, and location of test by column grid/ piece number as noted in the shop drawings.

1.05 QUALITY ASSURANCE

- A Fabricate structural steel members in accordance with AISC-Steel Construction Manual "Specification for Structural Steel Buildings".
- B Provide qualifications for review and approval during the bidding process:
1. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE, **OR** as approved in writing after examination of Installer history by Structural Engineer.
  2. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD" at time of bid **OR** as approved in writing after examination of Fabricator history by Structural Engineer.
- C Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."
1. Comply with applicable provisions of the following specifications and documents:
  2. AISC's "Code of Standard Practice for Steel Buildings and Bridges."
  3. AISC's "Seismic Provisions for Structural Steel Buildings" and "Supplement No. 2."
  4. AISC's "Specification for Structural Steel Buildings"
  5. AISC's "Specification for the Design of Steel Hollow Structural Sections."
  6. AISC's "Specification for Allowable Stress Design of Single-Angle Members".
  7. AISC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.06 QUALIFICATIONS

- A Fabricator: Company specializing in performing the work of this section with minimum 3 years experience approved by the American Institute of Steel Construction Quality Certification Program, Category II or III.
1. A Fabricator not complying with Category II or III shall have an established, documented in-house quality control and testing program to assure accuracy and adequacy of fabrication procedures and completed work, or shall have fabrication procedures and fabricated steel tested and inspected by an independent testing agency as directed by the Structural Engineer. Tests and inspections are to be preformed by AWS Certified Welding Inspectors. **Fabricator shall submit documentation of quality control procedures to the Structural Engineer for review. The Structural Engineer shall be the sole judge of the adequacy of the proposed quality control program.** Submit copies of the inspection reports to the Structural Engineer. Payment of these tests and inspections will be by the fabricator. Tests and inspections shall include the following:
    - a. Examine mill tests reports and verify that material being used is the same as the mill test reports.
    - b. Review the fabricator's written welding procedures. Verify that the fabricator's welding procedures are being adhered to.
    - c. Verify that welders are certified with current papers and that they demonstrate proper techniques.
    - d. Examine joint preparation for complete penetration joints. Ultrasonically test complete penetration joints.
    - e. Examine fillet welds for proper size, profile, throat, porosity and end returns.
    - f. Examine steel members for laminations. Spot check dimensions and hole sizes.
    - g. The purpose of this inspection is to enable the testing agency to verify that, in general, the steel is being fabricated in accordance with the proper specifications. A minimum of one trip should be scheduled in the early stages of fabrication.
- B Erector: Company specializing in performing the work of this section with a minimum 3 years experience.
- C Design connections not detailed on the Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the state where the project is located.

1.07 REFERENCES

A The following are to be used as reference standards:

1. Structural Steel angles, channels, and plate: ASTM A36; W-Shapes: A992.
2. ASTM A108 - Steel Bars, Carbon, Cold Finished, Standard quality.
3. ASTM A123 - Zinc (Hot Dipped Galvanized) Coatings on iron and steel products.
4. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.
5. ASTM A325 - High Strength Bolts for Structural Steel Joints.
6. ASTM A500 - Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
7. AWS A2.0 - Standard Welding symbols.
8. AWS D1.1 - Structural Welding Code.
9. AISC - Specification for the design, Fabrication and Erection of Structural Steel for Buildings.
10. SSPC - Steel Structures Painting Council.

1.08 SPECIAL INSPECTIONS

A Special inspections shall be performed by a Special Inspector retained by the Owner.

B Bolted Connections: Field-bolted connections will be tested and inspected according to AISC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1. Manually torque test 10% of all bolted connections to verify correct tightness.

C Welded Connections: Field welds will be visually inspected according to AWS D1.1. A certified AWS Weld Inspector shall visually inspect 100% of welded moment connections and 10% of all other welded connections.

1. In addition to visual inspection, if requested by the Engineer, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:
  - a. Liquid Penetrant Inspection: ASTM E 165.
  - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
  - c. Ultrasonic Inspection: ASTM E 164.
  - d. Radiographic Inspection: ASTM E 94.

D In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.
3. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

1.09 DELIVERY, STORAGE, AND HANDLING

A Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.

1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
2. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.10 COORDINATION

- A Furnish anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 PRODUCTS

2.01 STRUCTURAL-STEEL MATERIALS

- A Structural Steel Members: Channels, Angles, Plates, M and S shapes: ASTM A36.
- B W-Shapes: ASTM A992, Grade 50.
- C Plate and Bar: ASTM A 36/A 36M.
- D Corrosion-Resisting Structural Steel: ASTM A 588/A 588M, Grade 50 (345).
- E Structural Tubing: ASTM A500, Grade B.
- F Corrosion-Resisting Cold-Formed Hollow Structural Sections: ASTM A 847, structural tubing
- G Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
1. Weight Class: As indicated on the drawings.
  2. Finish: Black, except where indicated to be galvanized.
- H Medium-Strength Steel Castings: ASTM A 27/A 27M, Grade 65-35 (Grade 450-240), carbon steel.
- I High-Strength Steel Castings: ASTM A 148/A 148M, Grade 80-50 (Grade 550-345), carbon or alloy steel.
- J Headed Studs: ASTM A108, Grade 1015, forged steel, headed, uncoated.
- K Welding Materials: AWS D1.1; type required for materials being welded.
- L Grout: No-shrink type, premixed compound consisting of nonmetallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 28 days.
- M Shop and Touch-Up Primer: SSPC Paint 15, Type 1, red oxide or fabricator's standard.
- N Protection for Structural Steel from Earth, Stone Backfill, or Concrete Backfill: 1/8 inch thick coat Hydrocide Mastic. Use one of the following in accordance with manufacturer's recommendations:
1. One coat Hydrocide 700 or two coats Hydrocide 700B by Degussa Building Systems.
  2. One coat MasterSeal 614 or two coats MasterSeal 615 by BASF.
  3. Additional alternate manufacturers must be approved by Engineer prior to Bidding and provide product equal to or exceeding specified requirements.
- 2.02 BOLTS, CONNECTORS, AND ANCHORS
- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436
1. Finish: Plain.
  2. Direct-Tension Indicators: If requested by Engineer: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8,) compressible-washer type.
    - a. Finish: Plain.
- B High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavy hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563

(ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers, plain.

1. Direct-Tension Indicators: ASTM F 959, Type 490 (ASTM F 959M,) Type 10.9, compressible-washer type, plain.
- C Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: If requested by Engineer: ASTM F 1852, Type 1, heavy hex or round head steel structural bolts with splined ends; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.
1. Finish: Plain.
- D Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.
- E Unheaded Anchor Rods: ASTM F 1554, Grade 36.
1. Configuration: Straight.
  2. Nuts: ASTM A 563 (ASTM A 563M) hex carbon steel.
  3. Plate Washers: ASTM A 36/A 36M carbon steel.
  4. Washers: ASTM F 436 (ASTM F 436M) hardened carbon steel.
  5. Finish: Plain.
- F Headed Anchor Rods: ASTM F 1554, Grade 36.
1. Nuts: ASTM A 563 (ASTM A 563M) hex carbon steel.
  2. Plate Washers: ASTM A 36/A 36M carbon steel.
  3. Washers: ASTM F 436 (ASTM F 436M) hardened carbon steel.
  4. Finish: Plain.
- G Threaded Rods: ASTM A 36/A 36M and ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6).
1. Nuts: ASTM A 563 (ASTM A 563M) hex carbon steel.
  2. Washers: ASTM F 436 ASTM F 436M or hardened ASTM A 36/A 36M carbon steel where noted.
  3. Finish: Plain.
- H Clevises/Turnbuckles: ASTM A 108, Grade 1035, cold-finished carbon steel.
- I Eye Bolts and Nuts: ASTM A 108, Grade 1030, cold-finished carbon steel.
- J Sleeve Nuts: ASTM A 108, Grade 1018, cold-finished carbon steel.
- 2.03 FINISH
- A Prepare structural component surfaces in accordance with SSPC SP-2.
- B Shop prime structural steel members. Do not prime surfaces that will be field welded or high strength bolted, or in contact with concrete or masonry.
- 2.04 PRIMER
- A Primer: SSPC-Paint 25, Type II, iron oxide, zinc oxide, raw linseed oil, and alkyd.
- B Primer: Fabricator's standard lead- and chromate-free, non-asphaltic, rust-inhibiting primer.

PART 3 EXECUTION

3.01 FIELD MEASUREMENTS

- A Verify that field measurements are as shown on shop drawings.

3.02 FABRICATION

A Shop Fabrication and Assembly

1. Fabricate items of structural steel in accordance with AISC specifications for Type I construction and as indicated on the approved shop drawings. Provide camber in structural members as shown.
2. Properly mark and match-mark materials for field assembly and for identification as to the structure and site for which they are intended. Fabricate for a delivery sequence that will expedite erection and minimize field handling of materials.
3. Where finishing is required, complete the assembly (including welding of units) before start of finishing operations. Provide finish surfaces of members exposed in the final structure free of markings, burrs, and other defects.

B Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings.

1. Camber structural-steel members where indicated.
2. Identify high-strength structural steel according to ASTM A 6/ A 6M and maintain markings until structural steel has been erected.
3. Mark and match-mark materials for field assembly.
4. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

C Architecturally Exposed Structural Steel: Comply with fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel identified as architecturally exposed structural steel.

1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, seam marks, roller marks, rolled trade names, and roughness.
2. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.

D Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.

E Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

F Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

G Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning or SSPC-SP 3, "Power Tool Cleaning."

H Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

I Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural steel. Straighten as required to provide uniform, square, and true members in completed wall framing.

- J Welded Door Frames: Build up welded door frames attached to structural steel. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk, cross-recessed head machine screws, uniformly spaced not more than 10 inches (250 mm) o.c., unless otherwise indicated.
- K Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.
1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
  2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
  3. Weld threaded nuts to framing and other specialty items indicated to receive other work.
- L Connections
1. Provide bolts and washers of all types and sizes required for the completion of all field erection.
  2. High Strength Bolted Construction: Install high strength threaded fasteners in accordance with AISC Specifications for Structural Joints Using ASTM A325 Bolts, 3/4" diameter, minimum. Connections are to be considered bearing connections.
  3. Install by the turn of the nut method, or direct tension indicators or alternate design bolts.
  4. Welded Construction: Comply with the AWS Code for procedures, appearance, and quality of welds and for methods used in correcting welded work. Grind smooth any welds that will be exposed.
  5. Assemble and weld built-up sections by methods that produce true alignment of axes without warp.
- 3.03 SHOP CONNECTIONS
- A High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Types: Snug tightened, Pretensioned.
- B Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
1. Remove backing bars or runoff tabs, back gouge, and grind steel smooth if to remain exposed.
  2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
  3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
    - a. Grind butt welds flush.
  4. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.
- C Holes for Other Work
1. Provide holes required for securing other work to structural steel framing and the passage of other work through steel framing members as shown on the final shop drawings. Provide threaded nuts welded to framing and other specialty items as shown to receive other work.
  2. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

D Anchor Bolts

1. Provide anchor bolts and other connectors required for securing structural steel to foundations and other in-place work.
2. Provide templates and other devices necessary for presetting bolts and other anchors to accurate locations.

E Bases and Bearing Plates

1. Bases and bearing plates shall be shop welded to columns and members attached to concrete and masonry. Install slide bearing plates and protect against damage in accordance with the manufacturer's written directions.

F Splicing

1. Splice members only where indicated unless, with the Architect's approval, splices not indicated would result in lower costs due to reduced shipping costs. Submit structural calculations signed by a structural engineer licensed where the fabricator is located for all splices not indicated.

G Gas Cutting

1. Do not use gas cutting torches for correcting fabrication errors in the structural framing. Cutting will be permitted only on secondary members, as acceptable to the Architect. Finish gas cut sections equal to a sheared appearance when gas cutting is permitted.

3.04 SHOP PRIMING

A Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials.
5. Galvanized surfaces.

B Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning." Other methods if approved by Engineer.

C Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

Stripe paint corners, crevices, bolts, welds, and sharp edges.

1. Apply two coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

D Painting: Apply a 1-coat, non-asphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils (0.038 mm).

3.05 EXAMINATION

A Verify that field conditions are acceptable and are ready to receive work.

B Beginning of installation means erector accepts existing conditions.

3.06 ERECTION

A Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.

B Field weld components indicated on Drawings and Shop Drawings.

C Do not field cut or alter structural members without approval of Architect.

D After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

E Grout under baseplates and bearing plates prior to installation of secondary framing.

F Erection shall be in accordance with AISC Code of Standard Practice.

G Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings".

H Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.

1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of base plate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and base or bearing plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

I Maintain erection tolerances of structural steel and architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

J Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.

K Splice members only where indicated.

L Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.

M Do not use thermal cutting during erection unless approved by Engineer. Finish thermally cut sections within smoothness limits in AWS D1.1.

N Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

O Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

3.07 FIELD CONNECTIONS

- A High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened Pretensioned.
- B Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings" for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
  2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
  3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.08 REPAIRS AND PROTECTION

- A Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories and abutting structural steel.
1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
  2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Additional requirements for structural steel members designated as architecturally-exposed structural steel (AESS).

1.02 RELATED REQUIREMENTS

- A. Section 05 12 00 - Structural Steel Framing: General requirements for structural steel members, including AESS framing specified in this section.
- B. Section 05 21 00 - Steel Joist Framing: Alignment and location of bridging where joists are visible.
- C. Section 05 31 00 - Steel Roof Decking: Erection requirements relating to exposed steel decking and its connections.
- D. Section 05 50 00 - Metal Fabrications: Loose steel bearing plates and miscellaneous steel framing.
- E. Section 09 91 13 - Exterior Painting: Finish coat requirements and coordination with primer and surface preparation specified in this section.

1.03 DEFINITIONS

- A. Architecturally-Exposed Structural Steel: Structural steel complying with designated AESS category as defined in AISC 303.

1.04 REFERENCE STANDARDS

- A. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges.
- B. AISC 360 - Specification for Structural Steel Buildings.
- C. ASTM A6/A6M - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- F. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- G. ASTM A1085/A1085M - Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS).
- H. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.
- I. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
- J. AWS D1.1/D1.1M - Structural Welding Code - Steel.
- K. SSPC-SP 1 - Solvent Cleaning.
- L. SSPC-SP 6 - Commercial Blast Cleaning.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Schedule and conduct a preinstallation meeting at project site one week prior to start of work of this section; require attendance by all affected installers. Coordinate requirements for shipping, special handling, storage, attachment of safety cables and temporary erection bracing, final coating, touch-up painting, mock-up coordination, MBI Companies' observations, and other requirements for AESS.

1.06 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product data for each type of product specified. Submit paint systems in accordance with Section 09 91 13.
- C. Shop Drawings: Detailing for fabrication of AESS components.
  - 1. Provide erection documents clearly indicating which members are AESS members and the AESS category of each part.
  - 2. Include details that clearly identify AESS requirements found in this specification. Provide connections for AESS consistent with concepts shown on drawings.
  - 3. Indicate welds by AWS A2.4 symbols, distinguishing between shop and field welds, and show size, length and type of each weld. Identify grinding, finish and profile of welds as defined by the designated AESS category.
  - 4. Indicate orientation of hollow structural section (HSS) seams and mill marks (where applicable).
  - 5. Indicate type, size, finish and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip-critical, direct-tensioned shear/bearing connections. Indicate orientation of bolt heads.
  - 6. Indicate which surfaces or edges are exposed and what class of surface preparation is being used.
  - 7. Indicate special tolerances and erection requirements as noted on drawings or defined by the designated AESS category.
  - 8. Indicate vent or drainage holes for HSS members.
- D. AESS 1, AESS 2, AESS 3, AESS 4, and AESS C Samples: Provide samples of specific AESS characteristics. Samples may be small size samples or components of conventional structural steel demonstrating specific AESS characteristics, including surface preparation, sharp edges ground smooth, continuous weld appearance, weld show through, and fabrication mark removal.
- E. Qualification data for fabricator and erector to demonstrate their capabilities and experience. Include lists of completed projects names and address, names and addresses of architects and owners, photographs showing detail of installed AESS, and other information specified.

1.07 QUALITY ASSURANCE

- A. Fabricator Qualifications: In addition to those qualifications listed in Section 05 12 00, engage an AISC Certified Fabricator, experienced in fabricating AESS similar to that indicated for this project with a record of successful in-service performance, as well as sufficient production capacity to fabricate AESS without delaying the work.
- B. Erector Qualifications: In addition to those qualifications listed in Section 05 12 00, engage an AISC Certified Erector, experienced in erecting AESS work similar in material, design, and extent to that indicated for this project and with a record of successful in-service performance.
- C. Comply with applicable provisions of AISC 303, Section 10 for the designated AESS category.
- D. Owner to engage a quality assurance agency per requirements of AISC 360, Chapter N and AISC 303, Section 10.

1.08 MOCK-UP

- A. Provide mock-ups for AESS 3 of nature and extent indicated in Contract Documents.
- B. See Section 01 40 00 - Quality Requirements for additional requirements.
- C. Locate mock-ups in fabricator's shop. Mock-ups to be full-size unless MBI Companies approves smaller models. Alternatively, when a mock-up is not practical, the first piece of an element or connection can be used to determine acceptability.
- D. Notify MBI Companies one week in advance of dates and times when mock-ups will be available for review.
- E. Demonstrate applicable AESS characteristics for specified category of AESS on elements and joints in mock-up.
- F. Build mock-ups using member sizes and materials indicated for final work.
- G. Mock-up to demonstrate weld quality, contouring of welds at aligned walls of members, specified surface preparation, and finish coating.

- H. HSS members to extend at least 6 inches from joint in mock-up.
- I. Obtain MBI Companies written approval of mock-ups before starting fabrication.
- J. Retain and maintain mock-ups during construction in an undisturbed condition as a standard for judging completed work.
- K. Approved mock-ups in an undisturbed condition at Date of Substantial Completion may become part of completed work.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Handle finished pieces in accordance with Section 10 of AISC 303, using nylon-type slings, or chains with softeners, or wire ropes with softeners such that they are not damaged.
- B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. Use special care in handling to prevent twisting or warping of AESS members.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Comply with Section 05 12 00, except as amended in this section for aesthetic purposes.
- B. Comply with AISC 303, Section 10 for specific AESS category designated on drawings.

2.02 FABRICATION

- A. Fabricate and assemble AESS in shop to greatest extent possible. Locate field joints in AESS assemblies at concealed locations or as approved by MBI Companies. Detail AESS assemblies to minimize field handling and expedite erection.
- B. Permissible tolerances for member depth, width, out of square, and camber and sweep to be as specified in ASTM A6/A6M, ASTM A500/A500M, and ASTM A1085/A1085M.
- C. For curved structural members, whether composed of a single standard structural shape or built-up, the as-fabricated variation from theoretical curvature to be equal to or less than standard camber and sweep tolerances permitted for straight members in applicable ASTM standard.
- D. Use special care in handling and shipping of AESS both before and after shop painting to minimize damage to any shop finish. Use nylon-type slings or softeners when using chains or wire rope slings.
- E. Bolted Connections:
  - 1. Make in accordance with Section 05 12 00. Provide bolt type and finish as noted herein.
- F. Welded Connections:
  - 1. Comply with AWS D1.1/D1.1M and Section 05 12 00.
  - 2. Assemble and weld built-up sections by methods that will maintain alignment of members without warp exceeding tolerances of this section.
- G. Surface Preparation:
  - 1. Remove blemishes or unsightly surfaces resulting from temporary braces or fixtures.
  - 2. Remove backing and run out tabs.
- H. Fabricate AESS in accordance with categories defined in AISC 303, as follows:
  - 1. AESS 1: Basic elements.
  - 2. AESS 2: Feature elements viewed at a distance greater than 20 feet (feature elements not in close view).
  - 3. Design Intent for Exterior Canopy: AESS 3: Feature elements viewed at a distance less than 20 feet (feature elements in close view).
  - 4. AESS 4: Showcase elements with special surface and edge treatment beyond fabrication (showcase elements).

2.03 PAINT SYSTEM

- A. Compatibility: All components/procedures of AESS paint system to comply with coating system specified, submitted, and approved per Section 09 91 13 – Exterior Painting. As a minimum, identify required surface preparation, primer, intermediate coat (if applicable), and finish coat. Primer, intermediate coating, and finish coating to be from a single manufacturer combined in a system documented by manufacturer with adequate guidance for fabricator to procure and execute.
- B. Primer: As specified in Section 09 91 13 – Exterior Painting. Primer to comply with all federal standards for VOC, lead and chromate levels.
- C. Finish Coating: Field apply intermediate and top coats per Sections 09 91 13, 09 91 23, and 09 96 00.

2.04 SHOP PRIMING

- A. Surface Preparation:
  - 1. Provide surface preparations to meet SSPC-SP 6.
  - 2. Coordinate required surface profile with approved paint submittal prior to beginning surface preparation.
  - 3. Prior to blasting, remove any grease and oil using solvent cleaning to meet SSPC-SP 1.
  - 4. Remove weld spatter, slivers and similar surface discontinuities.
  - 5. Ease sharp corners resulting from shearing, flame cutting or grinding.
- B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted with slip-critical connections.
  - 1. Extend priming of members partially embedded in concrete or mortar to a depth of 2 inches.
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
  - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
  - 2. Apply two coats of shop primer to surfaces that are inaccessible after assembly or erection.

2.05 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by hot-dip process to AESS indicated for galvanizing according to ASTM A123/A123M. Fabricate such that all connections of assemblies are made in the field with bolted connections where possible.

2.06 MATERIALS

- A. General: Meet requirements of 05 12 00 as amended below.
- B. Tension Control, High-Strength Bolts, Nuts, and Washers: Per section 05 12 00, Tension Control Bolts. Provide standard carbon steel finish rounded bolt heads with twist off bolts; ASTM F3125/F3125M.

2.07 SOURCE QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Structural Requirements:
  - 1. Comply with quality control requirements per AISC 360, Chapter N and AISC 303, Section 10. Refer to Section 05 12 00 for additional requirements.
  - 2. Quality assurance agency to review work for compliance with requirements of AISC 360, Chapter N and AISC 303, Section 10.
- C. AESS 1 and 2 Acceptance: MBI Companies to observe AESS in the shop at a viewing distance consistent with final installation and determine acceptability based on qualification data and submittals. Quality assurance agency has no responsibility for enforcing requirements related to aesthetic effect.
- D. AESS 3,4, and C Acceptance: MBI Companies to observe AESS in the shop at a viewing distance consistent with final installation and determine acceptability based on approved mock-up. Quality assurance agency has no responsibility for enforcing requirements related to aesthetic effect.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Erector to check all AECS members upon delivery for twist, kinks, gouges or other imperfections which may result in rejection of appearance of member. Coordinate remedial action with fabricator prior to erecting steel.

3.02 PREPARATION

- A. Provide connections for temporary shoring, bracing and supports only where noted on approved fabrication documents. Temporary connections not shown are to be made at locations not exposed to view in final structure or as approved by MBI Companies.
- B. Handle, lift and align pieces using nylon straps or chains with softeners required to maintain appearance of AECS through process of erection.

3.03 ERECTION

- A. AECS 1 and 2: Basic elements; feature elements not in close view:
  - 1. Employ special care to handle and erect AECS. Erect finished pieces using nylon straps or chains with softeners such that they are not damaged.
  - 2. Place weld tabs for temporary bracing and safety cabling at points concealed from view in completed structure or where approved by MBI Companies during pre-installation meeting. Obtain MBI Companies approval of methods for removing temporary devices and finishing AECS members prior to erection.
  - 3. AECS Erection Tolerances: Erect to standard frame tolerances for structural steel per Chapter 7 of AISC 303.
  - 4. Set AECS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
  - 5. Remove blemishes or unsightly surfaces resulting from temporary braces or fixtures.
  - 6. Remove all backing and run out tabs.
  - 7. When temporary braces or fixtures are required to facilitate erection, take care to avoid any blemishes, holes or unsightly surfaces resulting from use or removal of such temporary elements.
  - 8. Bolted Connections: Align bolt heads on same side of connection as indicated on approved fabrication or erection documents.
  - 9. Welded Connections: Comply with AWS D1.1/D1.1M and Section 05 12 00. Appearance and quality of welds to be consistent. Employ methods that will maintain alignment of members without warp exceeding tolerance of this section.
  - 10. Remove weld spatter exposed to view.
  - 11. Grind off projections larger than 1/16 inch at field butt and plug welds.
  - 12. Continuous Welds: Where continuous welding is noted on drawings, provide continuous welds of a uniform size and profile.
  - 13. Do not enlarge holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts. Replace connection plates that are misaligned where holes cannot be aligned with acceptable final appearance.
  - 14. Splice members only where indicated.
  - 15. Obtain permission for any torch cutting or field fabrication from MBI Companies. Finish sections thermally cut during erection to a surface appearance consistent with mock-up.
- B. AECS 3: Feature elements in close view:
  - 1. Erect to requirements of AECS 1 and 2 and as follows:
  - 2. Field Welding: Weld profile, quality, and finish to be consistent with mock-ups approved prior to fabrication.
  - 3. Provide a continuous appearance to all welded joints including tack welds. Provide joint filler at intermittent welds.
- C. AECS 4: Showcase elements:
  - 1. Erect to requirements of AECS 3 and as follows:
  - 2. Grind welds smooth.
  - 3. Minimize Weld Show Through: At locations where welding on far side of an exposed connection creates distortion, grind distortion and marking of steel to a smooth profile with adjacent material.

4. Filling of Weld Access Holes: Where holes must be cut in web at intersection with flanges on W shapes and structural tees to permit field welding of flanges, fill holes with joint filler.
5. Where welds are indicated to be ground, contoured, or blended, oversize welds as required and grind to provide a smooth transition and match profile on approved mock-up.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Structural Requirements:
  1. Comply with quality control requirements per AISC 360, Chapter N and AISC 303, Section 10. Refer to Section 05 12 00 for additional requirements.
  2. Quality assurance agency to review work for compliance with requirements of AISC 360, Chapter N and AISC 303, Section 10.
- C. AESS 1 and 2 Acceptance: MBI Companies to observe AESS in place and determine acceptability based on qualification data and submittals. Quality assurance agency has no responsibility for enforcing requirements related to aesthetic effect.
- D. AESS 3,4, and C Acceptance: MBI Companies to observe AESS in place and determine acceptability based on qualification data and submittals as well as on approved mock-up. Quality assurance agency has no responsibility for enforcing requirements related to aesthetic effect.

3.05 CLEANING

- A. Touch-up Painting: Complete cleaning and touch-up painting of field welds, bolted connections, and abraded areas of shop paint to blend with adjacent surfaces of AESS. Perform touch-up work in accordance with manufacturer's instructions and as specified in Section 09 91 13 – Exterior Painting.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas. Repair galvanized surfaces in accordance with ASTM A780/A780M.
- C. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

- A Steel joists as shown on the drawings and specified herein.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 DEFINITIONS

- A SJI "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."
- B Special Joists: Steel joists or joist girders requiring modification by manufacturer to support non-uniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.04 SUBMITTALS

- A Meet the requirements of Structural Shop Drafting by AISC for shop drawings.
- B Provide calculations and/or certifications showing compliance with all design criteria stated in these specifications and noted in the Drawings.
- C Product Data: For each type of joist, accessory, and product indicated.
- D Shop Drawings: Show layout, designation, number, type, location, and spacing of joists. Include joining and anchorage details, bracing, bridging, joist accessories; splice and connection locations and details; and attachments to other construction.
1. Indicate locations and details of bearing plates to be embedded in other construction.
  2. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer responsible for its preparation.
- E Manufacturer Certificates: Signed by manufacturers certifying that joists comply with requirements.
- F Mill Certificates: Signed by bolt manufacturers certifying that bolts comply with requirements.

1.05 QUALITY ASSURANCE

- A Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables of SJI "Specifications."
1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.
- B SJI Specifications: Comply with standard specifications in SJI's "Specifications" that are applicable to types of joists indicated.
- C Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.06 SPECIAL INSPECTIONS

- A The Owner will engage a qualified Special Inspector to inspect field welds and bolted connections and to perform field tests and inspections and prepare test and inspection reports.

- B Field welds will be visually inspected according to AWS D1.1/D1.1M.
- C In addition to visual inspection, field welds will be tested according to AWS D1.1/D1.1M and the following procedures, as applicable if noted on the drawings:
  - 1. Radiographic Testing: ASTM E 94.
  - 2. Magnetic Particle Inspection: ASTM E 709.
  - 3. Ultrasonic Testing: ASTM E 164.
  - 4. Liquid Penetrant Inspection: ASTM E 165.
- D Bolted connections will be visually inspected.
- E High-strength, field-bolted connections will be tested and verified according to procedures in RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts."
- F Correct deficiencies in Work that test and inspection reports have indicated are not in compliance with specified requirements.
- G Additional testing will be performed to determine compliance of corrected Work with specified requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A Deliver, store, and handle joists as recommended in SJI's "Specifications."
- B Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

1.08 SEQUENCING

- A Deliver steel bearing plates to be built into cast-in-place concrete and masonry construction.

PART 2 PRODUCTS

2.01 JOISTS

- A Design joists for the loads indicated on the Drawings.
- B Use SJI standard camber unless the Drawings indicate otherwise; negative camber is unacceptable.

2.02 FASTENERS

- A ASTM A325 or A490 structural bolts, nuts and hardened washers.

2.03 BRIDGING

- A Standard of joist manufacturer, except as noted otherwise on the drawings.

2.04 SHOP PRIMER

- A Light gray chromate or red oxide primer, 2 mil dry thickness.

2.05 MATERIALS

- A Steel: Comply with SJI's "Specifications" for web and steel-angle chord members.
- B Steel Bearing Plates: ASTM A 36/A 36M.
- C Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.

1. Finish: Plain, uncoated
- D High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.
1. Finish: Plain.
- E Welding Electrodes: Comply with AWS standards.
- 2.06 PRIMERS
- A Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.
- 2.07 K-SERIES STEEL JOISTS
- A Manufacture steel joists of type indicated according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.
1. Joist Type: K-series steel joists and KCS-type K-series steel joists.
- B Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.
- C Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
- D Provide holes in chord members for connecting and securing other construction to joists.
- E Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications."
- F Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."
- G Camber joists according to SJI's "Specifications."
- H Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches (1:48).
- 2.08 LONG-SPAN STEEL JOISTS
- A Manufacture steel joists according to "Standard Specifications for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members; of joist type and end and top-chord arrangements as follows:
1. Joist Type: LH-series steel joists and DLH-series steel joists.
  2. End Arrangement: Underslung /Square as noted on drawings.
  3. Top-Chord Arrangement: Parallel.
- B Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
- C Provide holes in chord members for connecting and securing other construction to joists.
- D Camber long-span steel joists according to SJI's "Specifications."

- E Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches (1:48).

## 2.09 JOIST GIRDERS

- A Manufacture joist girders according to "Standard Specifications for Joist Girders" in SJI's "Specifications," with steel-angle top- and bottom-chord members; with end and top-chord arrangements as follows:
  - 1. End Arrangement: Underslung with bottom-chord extensions or as noted on the drawings.
  - 2. Top-Chord Arrangement: Parallel.
- B Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
- C Provide holes in chord members for connecting and securing other construction to joist girders.
- D Camber joist girders according to SJI's "Specifications".
- E Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches (1:48).

## 2.10 JOIST ACCESSORIES

- A Bridging: Schematically indicated. Detail and fabricate according to SJI's "Specifications." Furnish additional erection bridging if required for stability.
- B Steel bearing plates with integral anchorages are specified in Division 5 Section "Metal Fabrications."
- C Supply ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch (13 mm) of finished wall surface, unless otherwise indicated.
- D Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

## 2.11 CLEANING AND SHOP PAINTING

- A Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.
- B Do not prime paint joists and accessories to receive sprayed fire-resistive materials.
- C Apply 1 coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil (0.025 mm) thick.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 FABRICATION

- A Fabricate joists completely in the shop according to the latest SJI standards.
- B Joists may be fabricated from hot or cold formed sections of strip or sheet steel.

### 3.03 INSTALLATION

- A Do not start placement until supporting work is in place and secured.
- B Install and secure joists and permanent bridging before construction loading. Provide for distribution of temporary loading. Bar joists and joist girders to be erected per OSHA 1926.750.
- C Joists shall bear not less than 4 inches on masonry or concrete and not less than 2-1/2 inches on steel.
- D Coordinate the delivery of products with that of other materials. Avoid damage during unloading, storing, or erecting. Replace damaged joists.
- E Leave members clean. Touch up the shop coat in the field.
- F Do not install joists until supporting construction is in place and secured.
- G Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.
  - 1. Before installation, splice joists delivered to Project site in more than one piece.
  - 2. Space, adjust, and align joists accurately in location before permanently fastening.
  - 3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
  - 4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads have been applied.
- H Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- I Bolt joists to supporting steel framework using high-strength structural bolts. Comply with RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
- J Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

### 3.04 REPAIRS AND PROTECTION

- A Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists abutting structural steel, and accessories.
  - 1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
  - 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
- C Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that joists and accessories are without damage or deterioration at time of Substantial Completion.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Acoustical roof deck.
- B. Roof deck.
- C. Composite floor deck.
- D. Cellular floor deck.
- E. Metal form deck.
- F. Supplementary framing for openings up to and including 18 inches.
- G. Bearing plates and angles.
- H. Stud shear connectors.
- I. Acoustical insulation in roof deck flutes.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete topping over metal deck.
- B. Section 04 20 00 - Unit Masonry: Placement of anchors for bearing plates embedded in unit masonry assemblies.
- C. Section 05 12 00 - Structural Steel Framing: Placement of embedded steel anchors for bearing plates in cast-in-place concrete.
- D. Section 05 21 00 - Steel Joist Framing: Placement of embedded steel anchors for bearing plates and joist seats in cast-in-place concrete.
- E. Section 05 50 00 - Metal Fabrications: Steel angle concrete stops at deck edges.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished; 2013.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- D. ASTM A510/A510M - Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel; 2013.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.
- F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2016.
- G. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
- H. ASTM E384 - Standard Test Method for Microindentation Hardness of Materials; 2017.
- I. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).
- J. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018.
- K. FM (AG) - FM Approval Guide; current edition.
- L. FM DS 1-28 - Wind Design; 2016.
- M. FM DS 1-29 - Roof Deck Securement and Above-Deck Roof Components; Factory Mutual System; 2016.

- N. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; 2017.
- O. ICC-ES AC43 - Acceptance Criteria for Steel Deck Roof and Floor Systems; 2016.
- P. ICC-ES AC70 - Acceptance Criteria for Fasteners Power Driven into Concrete, Steel and Masonry Elements; 2016.
- Q. ITS (DIR) - Directory of Listed Products; current edition.
- R. SDI (DM) - Publication No.30, Design Manual for Composite Decks, Form Decks, and Roof Decks; 2007.
- S. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- T. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).
- U. UL (DIR) - Online Certifications Directory; Current Edition.
- V. UL (FRD) - Fire Resistance Directory; Current Edition.

#### 1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittals procedures.
- B. Shop Drawings: Indicate deck plan, support locations, projections, openings, reinforcement, pertinent details, and accessories.
- C. Product Data: Provide deck profile characteristics, dimensions, structural properties, and finishes.
- D. Certificates: Certify that products furnished meet or exceed specified requirements.
- E. Submit manufacturer's installation instructions.
- F. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.
- G. Designer's Qualification Statement.
- H. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

#### 1.05 QUALITY ASSURANCE

- A. Design deck layout, spans, fastening, and joints under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.
- B. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172.
- C. Installer Qualifications: Company specializing in performing the work of this Section with minimum 3 years of experience.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Cut plastic wrap to encourage ventilation.
- B. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Steel Deck:
  - 1. Canam Steel Corporation: [www.canam-steeljoists.ws](http://www.canam-steeljoists.ws).
  - 2. New Millennium Building Systems: [www.newmill.com](http://www.newmill.com).
  - 3. Nucor-Vulcraft Group: [www.vulcraft.com](http://www.vulcraft.com).
  - 4. EPIC Metals: [www.epicmetals.com](http://www.epicmetals.com).
  - 5. Substitutions: See Section 01 25 00 – Substitution Procedures.

2.02 STEEL DECK

- A. All Deck Types: Select and design metal deck in accordance with SDI Design Manual.
  - 1. Calculate to structural working stress design and structural properties specified.
  - 2. Maximum Vertical Deflection of Floor Deck: 1/360 of span.
  - 3. Maximum Vertical Deflection of Roof Deck: 1/240 of span.
  - 4. Maximum Vertical Deflection of Form Deck: 1/360 of span.
  - 5. Maximum Lateral Deflection of Diaphragms: 1/500 of the height of the wall.
- B. Acoustical Roof Deck: Non-composite type, steel sheet with plain vertical flute faces perforated with 1/8 inch diameter holes staggered 3/8 inch on center:
  - 1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 50 Min., with G90/Z275 galvanized coating.
    - a. Grade as required to meet performance criteria.
  - 2. Ungalvanized Steel Sheet: ASTM A1008/A1008M, Designation SS, Grade 50 Min., Type 1.
    - a. Grade as required to meet performance criteria.
  - 3. Primer: Shop coat of manufacturer's standard primer paint over cleaned and phosphatized substrate.
  - 4. Structural Properties:
    - a. Minimum Section Modulus: 0.169 in<sup>3</sup>/ft.
    - b. Span Design: Double.
  - 5. Minimum Base Metal Thickness: 22 gage, 0.0295 inch.
  - 6. Nominal Height: 1-1/2 inch.
  - 7. Profile: Fluted; SDI WR (Type BA).
  - 8. Formed Sheet Width: 36 inch.
  - 9. Side Joints: Nested or interlocking, welded or mechanically fastened.
  - 10. End Joints: Lapped, welded or mechanically fastened.
- C. Roof Deck: Non-composite type, fluted steel sheet:
  - 1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 50 Min., with G90/Z275 galvanized coating.
    - a. Grade as required to meet performance criteria.
  - 2. Ungalvanized Steel Sheet: ASTM A1008/A1008M, Designation SS, Grade 50 Min., Type 1.
    - a. Grade as required to meet performance criteria.
  - 3. Primer: Shop coat of manufacturer's standard primer paint over cleaned and phosphatized substrate.
  - 4. Structural Properties:
    - a. Minimum Section Modulus: 0.169 in<sup>3</sup>/ft.
    - b. Span Design: Double.
  - 5. Minimum Base Metal Thickness: 22 gage, 0.0295 inch.
  - 6. Nominal Height: 1-1/2 inch.
  - 7. Profile: Fluted; SDI WR (Type B).
  - 8. Formed Sheet Width: 36 inch.
  - 9. Side Joints: Nested or interlocking, welded or mechanically fastened.
  - 10. End Joints: Lapped, welded or mechanically fastened.
- D. Composite Floor Deck: Fluted steel sheet embossed to interlock with concrete:
  - 1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 50 Min., with G90/Z275 galvanized coating.
    - a. Grade as required to meet performance criteria.
  - 2. Ungalvanized Steel Sheet: ASTM A1008/A1008M, Designation SS, Grade 50 Min., Type 1.
    - a. Grade as required to meet performance criteria.
  - 3. Primer: Shop coat of manufacturer's standard primer paint over cleaned and phosphatized substrate.
  - 4. Structural Properties:
    - a. Section modulus: 0.326 in<sup>3</sup>/ft.
    - b. Span Design: Double.
  - 5. Minimum Base Metal Thickness: 20 gage, 0.0358 inch.
  - 6. Nominal Height: 2 inches.
  - 7. Profile: Fluted; SDI WR.

8. Formed Sheet Width: 36 inch.
  9. Side Joints: Nested or interlocking, welded or mechanically fastened.
  10. End Joints: Butt, welded or mechanically fastened.
- E. Cellular Floor Deck: Composite floor deck equipped with bottom flat sheet.
1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 50 Min., with G90/Z275 galvanized coating.
    - a. Grade as required to meet performance criteria.
  2. Primer: Shop coat of manufacturer's standard primer paint over cleaned and phosphatized substrate.
  3. Structural Properties:
    - a. Section modulus: 0.240 in<sup>3</sup>/ft.
    - b. Span Design: Multiple.
  4. Minimum Base Metal Thickness: 20 gage, 0.0358 inch.
  5. Nominal Height: 1-1/2 inches.
  6. Formed Sheet Width: 24 inch.
  7. Side Joints: Nested or interlocking, welded or mechanically fastened.
  8. End Joints: Butt, welded or mechanically fastened.
- F. Metal Form Deck: Corrugated sheet steel, with provision for ventilation of concrete:
1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 80, with G90/Z275 galvanized coating.
    - a. Grade as required to meet performance criteria.
  2. Ungalvanized Steel Sheet: ASTM A1008/A1008M, Designation SS, Grade 80, Type 1.
    - a. Grade as required to meet performance criteria.
  3. Primer: Shop coat of manufacturer's standard primer paint over cleaned and phosphatized substrate.
  4. Minimum Base Metal Thickness: 22 gage, 0.0295 inch.
  5. Nominal Height: 1 inch.
  6. Formed Sheet Width: 32, 33, or 36 inch.
  7. Side Joints: Nested or interlocking, welded or mechanically fastened..
  8. End Joints: Lapped, welded.

## 2.03 ACCESSORY MATERIALS

- A. Bearing Plates and Angles: ASTM A36/A36M steel, galvanized per ASTM A36/A36M.
- B. Stud Shear Connectors: Made from ASTM A108 Grade 1015 bars.
- C. Welding Materials: AWS D1.1/D1.1M.
- D. Fasteners: Galvanized hardened steel, self-tapping.
- E. Powder Actuated Mechanical Fasteners: Steel; with knurled shank and forged ballistic point. Comply with applicable requirements of ICC-ES AC70.
  1. Design Requirements: Provide number and type of fasteners that comply with the applicable requirements of SDI (DM) design method for roof deck and floor deck applications and ICC-ES AC43.
  2. Material: Steel; ASTM A510/A510M, Grade 1077.
    - a. Hardness: Rockwell C 54.5, minimum.
    - b. Tensile Strength: 285 kips per square inch, minimum.
    - c. Shear Strength: 175 kips per square inch, minimum.
    - d. Washers:
      - 1) Steel Bar Joist Framing Applications: 0.472 inch diameter, minimum.
      - 2) Exposed Roof Deck Applications: 0.591 inch diameter, minimum.
    - e. Corrosion Resistance:
      - 1) Steel Bar Joist Framing Applications: ASTM B633, SC1, Type III zinc electroplate..
      - 2) Exposed Roof Deck Applications: Provide manufacturer's standard stainless steel sealing caps with bonded neoprene washer over each fastener.
  3. Products:
    - a. Hilti: [www.hilti.com](http://www.hilti.com).
    - b. Simpson Strong-Tie: [www.strongtie.com](http://www.strongtie.com).

- c. Substitutions: See Section 01 25 00 – Substitution Procedures.
- F. Mechanical Fasteners: Steel; hex washer head, self-drilling, self-tapping.
  - 1. Design Requirements for Sidelap Connections: Provide number and type of fasteners that comply with the applicable requirements of SDI (DM)SDI design method for roof deck and floor deck applications and ICC-ES AC43.
  - 2. Fasteners for Steel Roof Decks Protected with Waterproofing Membrane: ASTM B633, SC1, Type III zinc electroplate.
  - 3. Fasteners for Exposed Steel Roof Deck Application: Manufacturer's standard stainless steel with bonded neoprene washer.
  - 4. Products:
    - a. Hilti: [www.hilti.com](http://www.hilti.com).
    - b. ITW Commercial Construction North America; ITW CCNA-Buildex Tek's Select Series: [www.ITWBuildex.com](http://www.ITWBuildex.com).
    - c. Simpson Strong-Tie: [www.strongtie.com](http://www.strongtie.com).
    - d. Substitutions: See Section 01 25 00 – Substitution Procedures.
- G. Weld Washers: Mild steel, uncoated, 3/4 inch outside diameter, 1/8 inch thick.
- H. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- I. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, complying with VOC limitations of authorities having jurisdiction.
- J. Flute Closures: Closed cell foam rubber, 1 inch thick; profiled to fit tight to the deck.
- K. Acoustical Insulation: Glass fiber type, minimum 1.1 lb/cu ft density; profiled to suit deck.
- 2.04 FABRICATED DECK ACCESSORIES
  - A. Sheet Metal Deck Accessories: Metal closure strips, wet concrete stops, and cover plates, 22 gage, 0.0295 inch thick sheet steel; of profile and size as indicated; finished same as deck.
  - B. Cant Strips: Formed sheet steel, 20 gage, 0.0358 inch minimum thickness, 45 degree slope, 3-1/2 inch nominal width and height, flange for attachment.
  - C. Roof Sump Pans: Formed sheet steel, 14 gage, 0.0747 inch minimum thickness, flat bottom, sloped sides, recessed 1-1/2 inches below roof deck surface, bearing flange 3 inches wide, sealed watertight.
  - D. Floor Drain Pans: Formed sheet steel, 14 gage, 0.0747 inch minimum thickness, flat bottom, sloped sides, recessed 1-1/2 inches below floor deck surface, bearing flange 3 inches wide, sealed watertight.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify existing conditions prior to beginning work.

#### 3.02 INSTALLATION

- A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.
- B. On concrete and masonry surfaces provide minimum 4 inch bearing.
- C. On steel supports provide minimum 1-1/2 inch bearing.
- D. Fasten deck to steel support members at ends and intermediate supports at 12 inches on center maximum, parallel with the deck flute and at each transverse flute using methods specified.
  - 1. Welding: Use fusion welds through weld washers.
  - 2. Place and secure special deep fluted sections for integral concrete bridging.
- E. Clinch lock seam side laps.
- F. At mechanically fastened male/female side laps fasten at 24 inches on center maximum.

- G. Drive mechanical side lap connectors completely through adjacent lapped sheets; positively engage adjacent sheets with minimum three-thread penetration.
- H. At welded male/female side laps weld at 18 inches on center maximum.
- I. Weld deck in accordance with AWS D1.3/D1.3M.
- J. At deck openings from 6 inches to 18 inches in size, provide 2 by 2 by 1/4 inch steel angle reinforcement. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and fusion weld to deck at each flute.
- K. At deck openings greater than 18 inches in size, provide steel angle reinforcement. as specified in Section 05 12 00.
- L. Where deck (other than cellular deck electrical raceway) changes direction, install 6 inch minimum wide sheet steel cover plates, of same thickness as deck. Fusion weld 12 inches on center maximum.
- M. At floor edges, install concrete stops upturned to top surface of slab, to contain wet concrete. Provide stops of sufficient strength to remain stationary without distortion.
- N. At openings between deck and walls, columns, and openings, provide sheet steel closures and angle flashings to close openings.
- O. Close openings above walls and partitions perpendicular to deck flutes with single row of foam cell closures.
- P. Place metal cant strips in position and fusion weld.
- Q. Position roof drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.
- R. Position floor drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.
- S. Weld stud shear connectors through steel deck to structural members below.
- T. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

- A Structural metal stud framing and fasteners as shown on drawings.
1. Furnish and install air infiltration barrier and flexible flashing at window openings.
  2. Insulate voids in metal stud assemblies during fabrication which would be inaccessible for installation of insulation at a later date.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.
1. Section 07 21 00 - Thermal Insulation.
  2. Section 09 21 16 – Gypsum Board Assemblies.
  3. Division 26 – Electrical.
  4. Division 27 – Communications.

1.03 SUBMITTALS

- A Submit Manufacturer's data on framing in accordance with Section 01 30 00.

1.04 QUALITY ASSURANCE

- A This project has been designed based on allowable loads and construction standards of (SSMA) Steel Stud Manufacturer's Association. To be considered as an equal product, the Contractor shall submit product data, installation details, and any other supplemental information required by the Structural Engineer in accordance with Section 01 30 00.
- B Structural steel studs shall be inspected by the Architect before they are to be concealed.
- C All structural steel studs and joists shall be factory color coded to provide a suitable visible means of field checking for proper location of gauge material.
- D Installer Qualifications: An experienced installer who has completed cold-formed metal framing similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- E Splices in studs shall not be permitted.
- F Engineering Responsibility: Engage a qualified professional engineer to prepare design calculations, Shop Drawings, and other structural data.
- G Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.
- H Mill certificates signed by steel sheet producer or test reports from a qualified independent testing agency indicating steel sheet complies with requirements, including uncoated steel thickness, yield strength, tensile strength, total elongation, chemical requirements, ductility, and galvanized-coating thickness.
- I Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

- J AISI Specifications: Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members" or "Load and Resistance Factor Design Specification for Cold-Formed Steel Structural Members" and the following for calculating structural characteristics of cold-formed metal framing:

1. CCFSS Technical Bulletin: "AISI Specification Provisions for Screw Connections."

#### 1.05 PERFORMANCE REQUIREMENTS

- A Structural Performance: Provide cold-formed metal framing capable of withstanding design loads indicated on the drawings within limits and under conditions indicated.
- B Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
1. Exterior Load-Bearing Wall Framing: Horizontal deflection of L/360 of the wall height.
  2. Exterior Load-Bearing Wall Framing With Brick Veneer: Horizontal deflection of L/600 of the wall height.
- C Design framing systems to provide for movement of framing members without damage or overstressing, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120° F.

### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A Steel Sheet: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
1. Grade: 33, Class 1.
  2. Grade: 33 for minimum uncoated steel thickness of 0.0428 inch and less; 50 Class 1 for minimum uncoated steel thickness of 0.0538 inch (1.37 mm) and greater.
  3. Coating: G60.
- B All members shall be designed in accordance with American iron and Steel institute (AISI) "Specification for the Design of Cold-Formed Steel Structural Members".
- C All framing members shall be formed from corrosion-resistant steel, corresponding to the requirements of AS5M A653, with a minimum yield strength of 40 ksi for studs, 33 ksi for runners.
- D Top and bottom track are to be the same gauge as the studs.
- E Framing members not scheduled otherwise on the drawings shall be not than less than 43 mils.
- F Steel studs shall be of size and gauge shown on the drawings. Studs not sized on the drawings shall be a minimum of 43 mils.

#### 2.02 AIR-INFILTRATION BARRIER

- A Proprietary building wrap with flame-spread and smoke-developed ratings of less than 25 and 450, respectively, when tested according to ASTM E 84. Provide one of the following products:
1. Spun Bonded Polyethylene sheet with aluminum coating on one face, formed by spinning continuous strands of fine, high-density-polyethylene interconnected fibers and bonding them together by heat and pressure; incorporating an additive to provide ultraviolet light resistance for up to 120 days; and with a water-vapor transmission rate equaling 535 g through 1 sq. m of surface in 24 hours according to ASTM E 96, Desiccant Method (Method A).
    - a. Product: Subject to compliance with requirements, provide "Tyvek ThermaWrap™" by DuPont Company.

2. Effective R-value: R-2 (including  $\frac{3}{4}$ " minimum airspace), as designated on ASHRAE tables, ASTM Handbook of Fundamentals, Chapter 25- Table 3.
  3. Air Penetration: 0.001 cfm/ft<sup>2</sup> at 1.57 psf, when tested in accordance with ASTM E 2178.
  4. Water Vapor Transmission: 36 perms, when tested in accordance with ASTM E 96, Method B.
  5. Water Penetration Resistance: 210 cm when tested in accordance with AATCC Test Method 127.
  6. Basis Weight: 2.6 oz/yd<sup>2</sup>, when tested in accordance with TAPPI Test Method T-410.
  7. Air Resistance: Air infiltration at >1000 seconds, when tested in accordance with TAPPI Test Method T-460.
  8. Tensile Strength: 29/27 lbs/in., when tested in accordance with ASTM D 882, Method A.
  9. Tear Resistance: 12/7 lbs., when tested in accordance with ASTM D 1117.
- B. Accessories:
1. Seam Tape: DuPont™ Tyvek® Metallized Tape or DuPont™ Tyvek® Tape as manufactured by DuPont.
    - a. Fasteners:
      - i. Steel Frame Construction: Tyvek® Wrap Cap Screws, as manufactured by DuPont: 1-5/8 inch rust resistant screw with 2-inch diameter plastic cap fasteners.
      - ii. Wood Frame Construction: Tyvek® Wrap Caps, as manufactured by DuPont Building Innovations: #4 nails with large 1-inch plastic cap fasteners or 1-inch cap staples.
    - b. Sealants : Provide sealants as recommended by the weather barrier manufacturer that comply with ASTM C 920, elastomeric polymer sealant to maintain watertight conditions.
    - c. Adhesives: Provide adhesive recommended by weather barrier manufacturer.
- C. Flashing: DuPont™ FlexWrap™, as manufactured by DuPont or other approved flexible membrane flashing materials for window openings and penetrations.
- 2.03 FRAMING ACCESSORIES
- A Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33,000 psi (230 MPa).
- B Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
1. Supplementary framing.
  2. Bracing, bridging, and solid blocking.
  3. Web stiffeners.
  4. End clips.
  5. Gusset plates.
  6. Joist hangers and end closures.
- 2.04 ANCHORS, CLIPS, AND FASTENERS
- A Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123.
- B Anchor Bolts: ASTM F 1554, Grade 36 threaded carbon-steel headless, hooked bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- C Mechanical Fasteners: Corrosion-resistant-coated, self-drilling, self-threading steel drill screws.
1. Head Type: Manufacturer's standard.
- D Welding Electrodes: Comply with AWS standards.

2.05 MISCELLANEOUS MATERIALS

- A Galvanizing Repair Paint: SSPC-Paint 20

2.06 FABRICATION

- A Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to manufacturer's written recommendations and requirements in this Section.
1. Fabricate framing assemblies using jigs or templates.
  2. Cut framing members by sawing or shearing; do not torch cut.
  3. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
  4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.
- B Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of finishing materials.
  2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.
- D. Insulate Voids in built-up components: Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume to a density equaling approximately 2.5 lb/cu. ft. (40 kg/cu. m).
1. Contractor may use Foamed in place insulation in lieu of glass fiber insulation to insulate voids in built-up components.
    - a. Foamed-In Place Insulation: Two component thermal insulation combining a plastic resin and catalyst foaming agent surfactant, properly mixed/rationed and combined with compressed air to produce a cold-setting foam insulation in cores of hollow concrete masonry walls.
      - i. Thermal Values: Provide "R" 3.7 per inch min. @ 32 degrees F. mean.
      - ii. Density: Dry 0.5 lb/ft<sup>3</sup>.
      - iii. Flame Spread: 25
      - iv. Smoke Developed: < 450
      - v. Permeance at 3.5 inches thickness: 7.7 perms per inch or less per ASTM E96.
      - vi. Corrosion: Non-corrosive.
      - vii. Toxicity: Non-toxic.
    - b. Acceptable Manufacturers:
      - i. PolyMaster, Inc. "PolyMaster® Incylthane 500".
      - ii. Tailored Chemical Products, Inc. "Core-Fill 500".

### PART 3 EXECUTION

#### 3.01 FRAMING

- A Prior to fabrication of framing, the contractor shall submit fabrication and erection drawings to the architect.
- B All framing components shall be cut squarely for attachment to perpendicular members, or as required, for an angular fit against abutting members.
- C Axially loaded studs shall be installed in a manner which will assure that their ends are positioned against the inside of runner web prior to fastening.
- D Fastening of components shall be with self-drilling screws or welding. Screws shall be of sufficient size to insure the strength of the connection. Wire tying of components shall not be permitted. All welds shall be touched up with a zinc-rich paint.
- E Coordinate with Plumbing, Mechanical, Electrical, and Communications Subcontractors to build-in required blocking for wall mounted equipment and devices.

#### 3.02 WALL FRAMING INSTALLATION

- A Runners and studs shall be securely anchored to the supporting structure. Complete, uniform and level bearing support shall be provided for bottom runner.
- B Abutting lengths of runner shall each be securely anchored to a common structural element, butt-welded or spliced.
- C Studs shall be plumbed, aligned and securely attached to flanges of both upper and lower runners. Framing of wall openings shall include headers and supporting studs.
- D Temporary bracing, where required, shall be provided until erection is completed.
- E Resistance to bending and rotation about the minor axis shall be provided by diagonally braced stud wall at all corners (horizontal strap or cold-rolled channel bracing.) Additional studs, when necessary, shall be positioned to resist the vertical components.
- F Splices in studs and cutouts in the flanges of studs shall not be permitted.
- G Provide additional bracing and anchorage as noted on the drawings.
- H Provide slip connections allowing for vertical movement (1/2" unless noted otherwise on the drawings) of the structure without imposing vertical loads on non-load bearing studs. Submit process and detail prior to installation.

#### 3.03 INSTALLATION - WEATHER BARRIER

- A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.
- B. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations
- C. Install weather barrier prior to installation of windows and doors.
- D. Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap.
- E. Install weather barrier silver side facing air space.

- F. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level
- G. Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacturer.
- H. Window and Door Openings: Extend weather barrier completely over openings.
- I. Overlap weather barrier
  - 1. Exterior corners: minimum 12 inches.
  - 2. Seams: minimum 6 inches.
- J. Weather Barrier Attachment:
  - 1. Attach weather barrier to studs. Secure using weather barrier manufacturer recommend fasteners, space 6 -18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.
- K. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.
- L. Seal any tears or cuts as recommended by weather barrier manufacturer.
- M. Opening Preparation:
  - 1. Cut weather barrier in a modified "I-cut" pattern.
  - 2. Cut weather barrier horizontally along the bottom of the header.
  - 3. Cut weather barrier vertically 2/3 of the way down from top center of window opening.
  - 4. Cut weather barrier diagonally from bottom of center vertical cut to the left and right corners of the opening.
  - 5. Fold side and bottom weather barrier flaps into window opening and fasten.
  - 6. Cut a head flap at 45-degree angle in weather barrier at window head to expose 8 inches of substrate. Temporarily secure weather barrier flap away from substrate with tape.
- N. Flashing:
  - 1. Cut 9-inch for metal stud construction wide flashing tape a minimum of 12 inches longer than width of sill rough opening.
  - 2. Cover horizontal sill by aligning flashing edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.
  - 3. Fan flashing at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.
  - 4. On exterior, apply continuous bead of sealant to wall or backside of window mounting flange across jambs and head. Do not apply sealant across sill.
  - 5. Install window according to manufacturer's instructions.
  - 6. Apply 4-inch wide strips of flashing at jambs overlapping entire mounting flange. Extend jamb flashing 1-inch above top of rough opening and below bottom edge of sill flashing.
  - 7. Apply 4-inch wide strip of flashing as head flashing overlapping the mounting flange. Head flashing should extend beyond outside edges of both jamb flashings.
  - 8. Position weather barrier head flap across head flashing. Adhere using 4-inch wide flashing over the 45-degree seams.
  - 9. Tape head flap in accordance with manufacturer recommendations.

10. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C 1193.

END OF SECTION



PART 1 GENERAL

1.01 SCOPE

- A Rough hardware, steel stair framing, stair handrails, and other miscellaneous shop fabricated steel items not included with steel fabrications specified in other Sections.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section 05 12 00 - Structural Steel Framing.

1.03 SUBMITTALS

- A Shop drawings detailing fabrication and erection of each metal fabrication. Include plans, elevations, sections and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other sections. Welder's certificates signed by Contractor certifying that welders comply with requirements specified herein.

1.04 QUALITY ASSURANCE

- A Fabrication firm shall have experience at successfully producing metal fabrications similar to those indicated, and have sufficient production capacity to produce required work without causing delay.
- B Installation of each item shall be performed by same firm that fabricated them.
- C Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel", D1.3 "Structural Welding Code – Sheet Steel".
- D Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved, and if pertinent, has undergone re-certification.

PART 2 PRODUCTS

2.01 MATERIALS

- A Cast Iron: Clean, tough gray iron free from blow holes, cinder spots or cold shuts. Conforming to ASTM Specifications.
- B Wrought Iron: (1) Plates, ASTM A52; Sheet, ASTM A162; and Bolts, Rods, Bars, ASTM A141.
- C Structural Steel: ASTM A36.
- D Aluminum: Type recommended by manufacturer unless specifically noted.

2.02 SHOP PAINT

- A All ferrous metal items shall be painted one coat of rust inhibitive shop primer except those with galvanized finish or to be embedded in concrete or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA1 "Paint Application specification No. 1" for shop painting.

2.03 BOLTS AND ANCHORS

- A Furnish and install all bolts, anchors, expansion bolts, etc., as needed to properly install all items of work, including woodwork, etc.

- B Joints: Tightly fitted, finished smooth and even concealed where possible, rivets countersunk on exposed surfaces. No drifting.
1. Steel: Riveted or welded.
  2. Castings: Concealed bolts or cap screws counter-sunk on face.
  3. Wrought Iron: Welded or machine screws.
  4. Exterior Work: Shed water and prevent entrance to hollow work.
  5. Aluminum: Welded, ground, and buffed for flush machine screws.
- 2.04 EQUIPMENT SUPPORTS
- A Provide equipment supports of structural shapes where shown and as detailed and where not furnished by equipment contractors.
- 2.05 METAL HANDRAILS AND GUARDRAILS
- A Materials: Standard steel pipe and steel bar of size indicated, cast or malleable iron flanges. Provide handrails both sides of all stairs and mechanical walkways. Provide guardrails on all open sides of equipment platforms
- B Joints: Welded, ground smooth.
- C Setting: Weld to structure and provide welded flanges at walls. Expansion bolt all flanges with countersunk flat head bolts.
- 2.06 STEEL LINTEL ANGLES FOR OPENINGS IN MASONRY
- A Unless otherwise shown, loose lintels shall be 16 inches larger than the masonry to masonry opening over which they occur. Unless otherwise shown, they shall be 6 inch by 3-1/2 inch by 3/8 inch angles, one for each 4 inches of wall thickness. Furnish other miscellaneous structural shapes to be built by masons or other trades which are not elsewhere specified.
- 2.07 ALUMINUM SHIPS LADDERS
- A Basis of Design:
1. Aluminum Ships Stair/Ships Ladder by Precision Ladders, LLC; [www.precisionladders.com](http://www.precisionladders.com).
  2. Substitution: See Section 01 25 00 – Substitution Procedures.
- B Performance Requirements:
1. Capacity: Unit shall support a 1,000 lb (454 kg) total load without failure.
  2. Degree of Incline: 60 to 70 degrees.
  3. Performance Standard: Units designed and manufactured to meet or exceed OSHA 1910.25.
- C Components:
1. Stair Stringer: 5 inch by 2 inch by 3/16 inch (127 mm by 51 mm by 5 mm) extruded 6005-T5 aluminum channel.
  2. Stair Treads: 5-3/16 inch by 1-1/8 inch by 1/8 inch (131 mm by 29 mm by 3 mm) extruded 6005-T5 aluminum with serrated slip resistance surface standard. 1-1/4 inch by 1-1/4 by 1-1/4 inch angle welded to underside of treads. Treads shall be welded and bolted to stringer with 1/4" stainless steel bolts.
  3. Stair Mounting Brackets:
    - a. Floor Brackets: 2 inch by 3 inch by 1/4 inch (51 mm by 76 mm by 6 mm) aluminum angle.
    - b. Top Bracket: 4-3/4 inch by 5 inch by 1/4 inch (121 mm by 127 mm by 6 mm) aluminum angle.
  4. Handrails: 1-1/4 inches (32 mm) Schedule 40, 6005-T5 aluminum pipe provided with internal aluminum fittings.
  5. Platform:

- a. Surface: Platforms 9 Sq Ft or less shall be made of standard tread material. Platforms larger than 9 Sq Ft shall have a bar grating surface.
- b. Toe Boards: 4 inch by 1/4" 6005 T-5 aluminum.
- c. Handrails: 1-1/4 inches (32 mm) Schedule 40, 6005-T5 aluminum pipe provided with internal aluminum fittings.
- 6. Handrail Extension:
  - a. 42 inch handrail extension (walk-thru) for accessing platforms, landings or elevated work spaces.
- 7. Finishes:
  - a. Standard: Mill finish on aluminum stair components.
  - b. Optional Finishes
    - i. Clear Anodized

## 2.08 STEEL STAIRS

- A Stringers, supports and connections for steel stairs shall be designed to sustain a live load of not less than 100 pounds per square foot. Treads shall be designed to carry a minimum concentrated load of 300 pounds on the centerline of tread span.
- B Stringers shall be 12" x 1-1/2" x 10.6# channels minimum. Exposed open ends of stringers shall be closed by filler plates welded in place.
- C Interior stair treads, unless noted otherwise, shall be designed to receive cement fill.
  - 1. Interior risers shall be closed with #12 gauge sheet steel riser plates secured to treads by bolting.
  - 2. Stair Treads at equipment mezzanines shall be galvanized rectangular bar steel grate treads with checker plate nosing similar to type SGW treads as manufactured by the McNichols Co. (800) 237-820.
- D Provide any necessary light I-beam, channel, angle or tee framing, hangers, etc., at various floor and platform levels to properly receive the stair construction.
- E Wall stringers shall continue around platforms, forming a base 4" high.
- F Bracket angles for treads and risers shall be at least 1-1/4" x 1-1/4" x 3/16" angles, welded to stringers.
- G Platforms shall be of not less than #12 gauge sheet steel. Support platforms on rolled tees spaced not over 30" on center. Tees shall be WT 2.5 x 8 for spans up to 5'-0". Longer spans shall be designed for a live load of 100 lbs. per sq. ft. Platforms shall be welded to tees.
- H All joints shall be ground smooth.

## 2.09 RAILINGS

- A General Requirements
  - 1. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.
  - 2. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 75 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935.
  - 3. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935.
  - 4. Allow for expansion and contraction of members and building movement without damage to connections or members.
  - 5. Dimensions: See drawings for configurations and heights.

- B Components:
1. Railings, unless otherwise noted, shall be fabricated of 1-1/2" O.D. black steel pipe. Railings shall be supported from stringers except where walls are adjacent to railings.
    - a. At locations indicated to receive steel handrails 2" or less in width, provide Sharpe Products #7335R supports (3-1/4 in. wall-to-center, 1-1/2 in. drop, formed 1/4" steel) finished to match handrails and spaced as recommended by the manufacturer unless otherwise noted on drawings.
    - b. Pickets at railings supported from stringers shall be spaced as required to prevent the passage of a 4 inch diameter sphere.

## 2.10 HINGES FOR DUMPSTER PAD GATES

- A Hinges shall be heavy duty barrel hinges similar and equal to BRHC7-212 as manufactured by Tennessee Fabricating Company, 2025 York Avenue, Memphis TN 38104, Phone: (901) 725-1548, Fax: (901) 725-5954. Hinges shall have 7" x 1-1/2" Barrel Diameter, 3/4" stainless steel pin, load capacity per pair: 2,200 lbs.

## 2.11 GROUT AND ANCHORING CEMENT

- A Non-Shrink, Non-Metallic Grout: Pre-mixed, factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with CECRD-C621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.
- B Interior Anchoring Cement: Factory-prepackaged, non-shrink, non-staining, hydraulic controlled expansion cement formulation for mixing with water in field to create pourable anchoring, patching, and grouting compound. Use for interior applications only.
- C Erosion Resistant Anchoring Cement: Factory-prepackaged, non-shrink, non-staining, hydraulic controlled expansion cement formulation for mixing with water in field to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without need for protection by sealer or waterproof coating and is recommended for exterior use by manufacturer.
- D Subject to compliance with requirements, acceptable products include, but are not limited to, the following:
1. Non-Shrink, Non-Metallic Grouts:
    - a. W.R. Bonsal Co.: Bonsal Construction Grout.
    - b. Concrete Service Materials: Diamond-Crete Grout.
    - c. Euclid Chemical Co.: Euco N-S Grout.
    - d. Chem-Masters Corp.: Kemset.
    - e. L & M Construction Chemicals, Inc.: Crystex.
    - f. Master Builders: Masterflow 713.
    - g. W.R. Meadows, Inc.: Sealtight 588 Grout.
    - h. Sonneborn Building Products Div. Rexnord Chemical Products Inc.: SonogROUT.
    - i. U.S. Grout Corp.: Five Star Grout.
    - j. Lambert Corp.: Vibropruf #11.
  2. Interior Anchoring Cement:
    - a. W.R. Bonsal Co.: Bonsal Anchor Cement.
    - b. Minwax Construction Products: Pro-Rok.
    - c. Master Builders: Masterflow 928 and 713.
    - d. Euclid Chemical Co.: Euco N-S Grout.
    - e. W.R. Meadows Inc.: Sealtight 588 Grout.
  3. Erosion -Resistant Anchoring Cement:
    - a. UGL: DRYLOK FastPlug Hydraulic Cement.
    - b. CGM Building Products: Super Por-Rok.

2.12 FASTENERS

- A Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for their intended use, type, grade, and class required.
1. Bolts and Nuts: Regular hexagon head type, ASTM A 307, Grade A.
  2. Lag Bolts: Square head type, FS FF-B-561.
  3. Machine Screws: Cadmium plated steel, FS FF-S-92.
  4. Wood Screws: Flat head carbon steel, FS FF-S-111.
  5. Plain Washers: Round, carbon steel, FS FF-W-92.
- B Drilled-In Expansion Anchors: Complying with FS FF-S-325, Group VIII (anchors, expansions, {non-drilling}), Type I (internally threaded tubular expansion anchor), and machine bolts complying with FS FF-B575, Grade 5.
1. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class and style as required.
  2. Lock Washers: Helical spring type, carbon steel, FS FF-W-84.
  3. Ferrous Metal Shop Primer: Manufacturer's or Fabricator's standard, fast-curing, lead-free, universal modified alkyd primer; selected for good resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure; complying with performance requirements of FS TT-P-645
  4. Galvanized Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint-20.
  5. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint-12 except containing no asbestos fibers.

2.13 FABRICATION

- A Ships Ladder: Completely fabricate stair ready for installation before shipment to the site.
- B Fabricate items from materials of size, thickness, and shapes indicated by not less than that required to comply with performance indicated. Work to dimensions indicated or accepted on shop drawings, using proven details for fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.
- C Fabricate exposed work true to line and level, with accurate angles and surfaces, and straight sharp edges.
- D Allow for thermal movement through a maximum ambient temperature change (range) of 100° F (55.5° C) in the design, fabrication, and installation of assemblies, without buckling, opening up of joints, and overstressing of welds of welds and fasteners. Base design calculations of actual surface temperatures of metals due to both solar heat gain and night time heat loss.
- E Shear and punch metals cleanly and accurately. Remove burrs.
- F Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- G Remove sharp or rough areas on exposed traffic surfaces.
- H Weld corners and seams continuously, complying with AWS recommendations and 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. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.

- I Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.
- J Provide anchorages of types indicated, coordinated with supporting substrates. Fabricate and space anchoring devices to provide adequate support for intended use.
- K Assemble items in shop to greatest extent possible. Partially fabricate only as necessary for shipping and handling limitations. Employ connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- L Cut, reinforce, drill, and tap miscellaneous metal work as indicated to receive finish hardware and similar items.
- M Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weeps where water may collect.

#### 2.14 ROUGH HARDWARE

- A Furnish/fabricate bent or otherwise custom fashioned bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing/supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Furnish straight bolts and other stock rough hardware items as specified in DIVISION 6 Sections.
- B Fabricate items to sizes shapes and dimensions required. Furnish malleable iron washers for heads and nuts which bear on wood structural connections; elsewhere, provide steel washers.

#### 2.15 BEARING AND LEVELING PLATES

- A For steel items bearing on masonry or concrete, provide loose bearing and leveling plates, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

#### 2.16 FINISHES, GENERAL

- A Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
- B Finish metal fabrications after assembly.

#### 2.17 STEEL AND IRON FINISHES

- A Galvanizing: For items indicated to be galvanized, apply zinc-coating by the hot-dip process in compliance with the following requirements:
  - 1. ASTM A 153 for galvanizing iron and steel hardware.
  - 2. ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch thick and heavier.
- B Prepare uncoated ferrous metal surfaces for shop priming in compliance with the following requirements for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
  - 1. Exteriors (SSPC Zone 1B): SSPC-SP6 "Commercial Blast Cleaning".
  - 2. Interiors (SSPC Zone 1A): SSPC-SP3 "Power Tool Cleaning".
- C Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finish or to be embedded in concrete or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting.

### PART 3 EXECUTION

#### 3.01 INSTALLATION

- A Install anchorage devices and fasteners necessary for securing miscellaneous metal fabrications to substrates; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.
- B Perform cutting, drilling and fitting for installation of miscellaneous metal fabrications. From established lines and levels, locate and align fabrication accurately, at proper elevation, with edges and surfaces level, plumb, true and free of rack.
- C Temporarily brace anchors which are to be built into concrete, masonry or similar construction.
- D Fit exposed connections accurately together to form hairline joints. Grind exposed joints smooth and touch-up shop paint coat. Do not weld, cut or abrade the surfaces of exterior galvanized items, and those intended for bolted or screwed field connections.
- E For field welds, comply with AWS Code for procedures of manual shielded metal-arc welding, in appearance and quality of welds made, and methods used in correcting welding work.
- F Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
- G Obtain fusion without undercut or overlap. Remove welding flux immediately.
- H At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour matches adjacent surface.

#### 3.02 SETTING LOOSE PLATES

- A Clean concrete and masonry bearing surfaces of foreign matter and roughen to improve bonding. Clean bonding surface of bearing plates.
- B Set plates on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. do not remove shims; if protruding, cut-off flush with edge of bearing plate before packing with grout. Pack grout leaving no voids between bearing surface and plate.
- C Use metallic non-shrink grout in concealed locations where not exposed to moisture; use non-metallic, non-shrink grout in exposed locations, unless otherwise indicated.

#### 3.03 ADJUSTING AND CLEANING

- A Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint and paint exposed areas with same materials as used for shop painting. Comply with SSPC-PA1 requirements for touch-up of field painted surfaces. Apply by brush or spray to provide a minimum dry thickness of 2.0 mils.
- B Clean field welds, bolted connections and abraded areas of galvanized items and apply galvanizing repair paint in compliance with ASTM A 780.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Dimension lumber.
- B. Boards.
- C. Construction panels.
- D. Miscellaneous lumber.
- E. Sheet materials.
- F. Treated wood material.
- G. Fire retardant treated lumber.
- H. Trussed Rafters.
- I. Hardware and accessories.

1.02 RELATED DOCUMENTS

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.
  - 1. Section 06 41 00 – Architectural Wood Casework.
  - 2. Section 09 91 13 – Exterior Painting.
  - 3. Section 09 91 23 – Interior Painting.

1.03 SUBMITTALS

- A. Submit shop drawings on fabricated items.
- B. Pressure treated wood: Submit certification by treating plant stating chemicals and process used, net amount of salts retained, and conformance to applicable standards.
- C. Preservation treated wood: Submit certification for waterborne preservative that moisture content was reduced to moisture content specified elsewhere in this section.

1.04 REFERENCES

- A. Applicable Standards:
  - 1. American Plywood Association (APA), current standards.
  - 2. American Society for Testing and Materials (ASTM), standards as referenced herein.
  - 3. American Wood Preservers Association (AWPA), standards as referenced herein.
  - 4. Product Standards (PS) of the National Bureau of Standards, U.S. Department of Commerce, PS 20-99 for softwood lumber and PS 1-83 for softwood plywood.
- B. Grading rules; current rules of the following associations applicable to wood materials:
  - 1. Southern Pine Inspection Bureau (SPIB).
  - 2. Western Wood Products Association (WWPA).
  - 3. West Coast Lumber Inspection Bureau (WCLIB).
  - 4. National Lumber Grades Authority (NLGA).

1.05 QUALITY ASSURANCE

- A. Lumber: Lumber shall bear the grade stamp of a listed grading rules association certified by the Board of Review of the American Lumber Standards Committee (ALSC), identifying species or species combination, grade, moisture content at time of surfacing, mill origin and grading agency.
- B. Plywood: Plywood shall bear the stamp of American Plywood Association (APA), indicating type, grade, thickness, exposure durability, span rating, species group, edging, surface finish, and regulatory agency compliance.
- C. Pressure-preservative-treated wood materials: Pressure-preservative-treated lumber and plywood shall bear the quality standard stamp of the applicator indicating compliance with AWP standards, preservative type used, retention level, exposure conditions, treating company and plant location, year of treatment and name of certified treatment inspection agency.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site and place in areas protected from the weather.
- B. Store materials minimum 6" off of ground or floor on level blocking. Cover with waterproof sheets or tarps if stored outdoors. Provide for adequate air circulation and ventilation when covering materials. Do not store seasoned materials in wet or damp areas of building.
- C. Protect edges, ends, corners and surfaces of sheet materials from damage.

PART 2 PRODUCTS

2.01 DIMENSION LUMBER

- A. General: Provide dimension lumber of grades indicated according to the ALSC National Grading Rule (NGR) provisions of the inspection agency indicated.
- B. Moisture Content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.
- C. Framing: Grade No. 1 of any species with the required modulus of elasticity and extreme fiber stress in bending as indicated on structural drawings or approved by Engineer.

2.02 BOARDS

- A. Concealed Boards: Where boards will be concealed by other work, provide lumber with 15 percent maximum moisture content and of one of the following species and grade:
  - 1. Eastern softwoods, No. 3 Common per NELMA rules.
  - 2. Northern species, No. 3 Common or Standard per NLGA rules.
  - 3. Mixed southern pine, No. 2 per SPIB rules.
  - 4. Hem-fir, Standard per WCLIB rules or No. 3 Common per WWPA rules.
  - 5. Spruce-pine-fir, Standard per WCLIB rules or No. 3 Common per WWPA rules.
  - 6. Western woods, Standard per WCLIB rules or No. 3 Common per WWPA rules.

2.03 CONSTRUCTION PANELS

- A. Product:
  - 1. USG: ¾ inch Structo-Crete Structural Panels.
  - 2. Substitutions: See Section 01 25 00 – Substitution Procedures.
- B. Subflooring: Structural cementitious subfloor panels.
  - 1. Size: 4 feet x 8 feet x ¾ inch thick.
  - 2. Long Edges: Structural tongue & groove or square edge.

3. Weight: 5.3 lbs/square foot.
  4. Allowable Load: 204 psf (1 span), 143 psf (2 spans), 150 psf (3 spans) with 24" o.c. at L/360 displacement limit. Refer to ICC ESR 1792 for complete Uniform Load Table (3A).
  5. Long Term Durability: 100 percent properties retention tested in accordance with ASTM C1185, Sec. 13 (140 degree F water for 56 days, tested after 48-hour room dry).
  6. Noncombustibility: Pass, tested in accordance with ASTM E136.
  7. Surface Burning Characteristics: 0 flame spread / 0 smoke developed, tested in accordance with ASTM E84.
  8. Mold Resistance: 10, tested in accordance with ASTM D3273 (no growth); 0, tested in accordance with G21 (no growth).
- C. Fasteners
1. Use only fasteners recommended by panel manufacturer.
- D. Floor Coverings and Underlayment
1. Follow floor covering manufacturer's installation procedures.
- 2.04 MISCELLANEOUS LUMBER
- A. General: Provide lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.
- B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.
- C. Moisture Content: 15 percent maximum for lumber items not specified to receive wood preservative treatment.
- D. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common grade per NELMA, NLGA, or WWPA; No. 2 grade per SPIB; or Standard grade per NLGA, WCLIB or WWPA of any species.
- 2.05 SHEET MATERIALS
- A. Interior Plywood: Wall Surfaces: APA-rated A-D, Group 1, Interior, thickness as indicated; A-grade veneer face to exposed side.
- B. Exterior Plywood - Wall and/or Roof Sheathing: APA-rated Sheathing, Exposure 1, Span rating shall be as required for support spacing at each condition.
- C. Preservative-Treated Plywood: APA-rated Sheathing, Exposure 1, Series V-611, thickness as indicated; pressure-preservative-treated as specified herein.
- 2.06 TREATED WOOD MATERIAL
- A. Preservative Treatment by Pressure Process: AWPAC2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPAC31 with inorganic boron (SBX).
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium: Alkaline Copper Quat (ACQ), or Copper Azole (CA type A or B)
  2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat items indicated on Drawings AND the following:
  - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
  - 2. Wood floor plates, sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
  - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
  - 4. Wood framing members that are less than 18" above the ground in crawlspaces or unexcavated areas.
- 5. Where Preservative treated wood is used in contact with metal other than G-90 hot dipped galvanized steel, a separation sheet of either 15-pound unperforated organic asphalt saturated roofing felt complying with ASTM D -226, or 10 mil polyethylene shall be placed between wood and metal to prevent corrosion from contact.

#### 2.07 FIRE RETARDANT TREATED LUMBER

- A. Comply with AWPA C-27 as applicable. Process shall not promote premature degradation of wood products in the conditions in which fire-treated lumber/panels will be installed.
  - 1. Provide materials with maximum moisture content, after treatment, of 15% or less.
  - 2. Manufacturer: Provide "Dricon FRT" or "D-Blaze FRT" by Chemical Specialties Inc., with current warranty.

#### 2.08 HARDWARE AND ACCESSORIES

- A. Fasteners and accessories: Provide nails, bolts, nuts, washers, screws, expansion bolts, lag bolts, clips, powder-actuated fasteners, anchor bolts and similar hardware necessary for complete installation of rough carpentry materials.
- B. Nails, fasteners and anchors for treated wood materials: Hot-dipped galvanized or type 304 or 316 stainless steel.
- C. Fasteners for attachment of plywood to light gage steel framing: Corrosion-resistant, type S-12 bugle head self-drilling screws; length as required to extend minimum 1/2" through framing member.
- D. Construction adhesive: meeting APA Performance Specification AFG-01.

### PART 3 EXECUTION

#### 3.01 WORKMANSHIP

- A. Install rough carpentry work cut square and straight to provide neat, fitted joints. Set to required levels and lines with members plumb, true, and aligned.
- B. Coordinate and lay out work to provide correct locations and opening to receive work of other trades.
- C. Install framing members aligned, leveled, plumbed and squared over bearing points.
- D. Secure carpentry work in place to substrates and supporting members using fasteners of types and sizes complying with building code requirements and as specified. Install fasteners without splitting wood and with positive anchorage into substrates or adjoining wood members.

- E. Anchor members rigid and secure to adequately resist design loads, maintaining proper alignment, free of warp or wind.
- F. Install linear runs of materials using longest lengths as practicable. Where multiple members are used to form linear runs, offset joints in member not less than three feet.
- G. Bolting: Drill holes 1/16" larger in diameter than bolt to be installed. Drill straight and true from one side only. Provide plates or washers between bolt head or nut and wood surface.
- H. Screws: Pre-bore holes same diameter as root of thread. Enlarge holes to shank diameter for length of shank.
- I. Make wood-to-wood fastenings with proper size cement coated nails.
- J. Install plywood and other sheet material in compliance with APA Design/Construction Guide - Residential and Commercial unless more stringent requirements are specified.

### 3.02 TREATED WOOD MATERIALS

- A. Handle and install treated wood in accordance AWPA M4-84.
- B. Coat cut edges and ends of pressure-preservative-treated wood, including drilled holes with a brushed-applied solution of copper naphthenate containing minimum 2% metallic copper.
- C. Attach treated wood materials using hot-dipped galvanized or stainless steel fasteners, nails or anchors as specified.

### 3.03 CONSTRUCTION PANELS INSTALLATION

- A. Panels shall be installed with long edges (tongue & groove) perpendicular to the framing. If primary framing direction changes, removal of the tongue from the first row of panels oriented in the new direction will be necessary for proper fastening. Care should be taken to ensure sufficient framing flange is available for fastening the panels in the new orientation.
- B. Fire, sound, and structural ratings listed in the 3/4" USG STRUCTO-CRETE® Brand Structural Panels Fire & Acoustic Manual - SCP100 for the 3/4" STRUCTO-CRETE® Panels systems are based on fastener attachment only, no adhesives.
- C. Ensure that all supporting members are free of debris before placing panels. Place the cut edge or tongue along the rim joist. Place each panel across three or more supports; minimum two-span condition. Less than full length panels at the end of a row may span a single framing opening. Cut panels to length as needed to ensure that the butt end of the panel is centered on the framing member. Install panels in a direction that ensures that the butt end falls over the open side of the joist. This will help keep adjacent ends in the same place.
- D. Penetrations in the panels should be made before installing the panel whenever possible.
- E. Ensure panel is flush with supporting member, drive fasteners so the heads are flush with the surface of the board.
- F. Protection: Prior to floor finishing, place minimum 3/8" (9.525 mm) thick plywood sheathing materials on the floor in high traffic areas over newly installed 3/4" STRUCTO-CRETE® Panels (i.e., additional 3/4" STRUCTO-CRETE® Panels or plywood). 1/4" plywood may be used in lieu of 3/8" material provided it is fastened at all four corners to prevent shifting and curling. Thicker protecting material may be required if heavier loads are expected or work is to be performed that may damage installed panels.

3.04 PLATES, BLOCKING, NAILERS, AND MISCELLANEOUS FRAMING

- A. Install minimum 2" nominal thickness wood members to support and to provide as a substrate for attachment of finishing materials, trim, fixtures, accessories and specialty items. Cut blocking to fit snug between studs, wedge, align and anchor to framing by end nailing or toenailing.
- B. Anchor members to structural steel or metal framing using appropriate bolts spaced at 48" o.c. maximum.
- C. Anchor members to concrete or masonry construction using cast-in anchor bolts, powder-actuated studs or sleeve, wedge or expansion type anchors, spaced at 48" o.c. maximum.
- D. Provide linear members in maximum practical lengths to minimize joints. Install multiple linear members so joints are offset minimum 36".
- E. Install anchors and fasteners positioned to be located within 3" of ends of members.
- F. Attach furring at 12" o.c. to substrates with appropriate fasteners spaced at maximum, 24" o.c.
- G. Wood Framed Walls: Install minimum 2" thickness solid wood blocking or framing members to firestop all vertical and horizontal concealed draft opening to comply with governing building code requirements. Firestopping members shall be of sizes matching full width or depth of framing or structural members. Walls exceeding eight feet in height shall be laterally braced with nominal 2" solid blocking, same width as studs, installed continuous in horizontal row at mid-point of wall height.

3.05 CLEAN UP

- A. Clean up debris and excess materials from this work and remove from site. Leave area broom clean.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specially fabricated cabinet units.
- B. Plastic Laminate Countertops.
- C. Hardware.
- D. Preparation for installing utilities.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 10 11 00 – Visual Display Units: For cork tackboard material at reception desk.
- C. Section 12 36 00 - Countertops.

1.03 REFERENCE STANDARDS

- A. ANSI/AWI 0641-2019 - Architectural Wood Casework Standard
- B. BHMA A156.9 - American National Standard for Cabinet Hardware.
- C. GSA CID A-A-1936 - Adhesive, Contact, Neoprene Rubber.
- D. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood.
- E. NEMA LD 3 - High-Pressure Decorative Laminates.
- F. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 DEFINITIONS

- A. Premium Grade: The aesthetic grade defining the highest degree of control over materials, workmanship, and installation. Selectively used in the most visible and high profile areas of a project, such as reception counters, boardrooms, and executive areas.
- B. Custom Grade: The aesthetic grade defining a high degree of control over materials, workmanship, and installation. Adequately covers most high-quality architectural woodwork.
- C. Economy Grade: The aesthetic grade defining the minimum degree of control over materials, workmanship, and installation. Typically reserved for woodwork not in public view, such as in mechanical rooms and utility areas.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

1.06 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
  - 1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
  - 2. Provide the information required by AWI/AWMAC/WI (AWS).
- C. Product Data:
  - 1. Provide data for hardware accessories.
  - 2. Provide proof of compliance with VOC limits for adhesives.

- D. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.
- E. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.
- F. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

#### 1.07 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
  - 1. If requested by the Architect, the casework manufacturer shall provide references and adequate samples of his work for review and approval as a supplier.
  - 2. Single Source Responsibility: Provide and install this work from single fabricator.

#### 1.08 MOCK-UP

- A. Provide mock-up of typical base cabinet, wall cabinet, and countertop, including hardware, finishes, and plumbing accessories.
- B. See Section 01 40 00 - Quality Requirements for additional requirements.
- C. Locate where directed.
- D. Architect-approved mock-up may remain as part of the Work.

#### 1.09 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from moisture damage.

#### 1.10 FIELD CONDITIONS

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Steve Ward & Associates, Knoxville, TN.
- B. Clancy Custom Woodworking, Knoxville, TN.
- C. Kitchen Sales, Knoxville, TN.
- D. Nolen Products, Knoxville, TN.
- E. Substitutions: See Section 01 25 00 – Substitution Procedures.
- F. Single Source Responsibility: Provide and install this work from single fabricator.

#### 2.02 CABINETS

- A. Quality Standard: Custom Grade, in accordance with ANSI/AWI 0641-2019, unless noted otherwise.
  - 1. Economy Grade:
    - a. Doors: Vertical grain; mismatch allowed.
    - b. Drawer fronts: Run grain vertically or horizontally at manufacturer's option.
  - 2. Custom Grade:
    - a. Doors, drawer fronts, and false fronts: Run wood grain vertically and match each cabinet unit.
  - 3. Premium Grade:
    - a. Doors, drawer fronts, and false fronts: Run wood grain vertically and match each cabinet unit.
      - 1) Provide well-matched faces across multiple cabinets in one elevation.

- 2) Provide Cathedral grain with crown of grain pointing up, and run in same direction for entire project.
- B. Plastic Laminate Faced Cabinets: Custom grade.
- C. Cabinets:
1. Finish - Exposed Exterior Surfaces:
    - a. Horizontal Surfaces Other Than tops: HGL
    - b. Vertical Surfaces: Grade HGS
    - c. Edges: Grade HGS
  2. Finish - Exposed Interior Surfaces:
    - a. Horizontal Surfaces Other Than tops: HGL
    - b. Vertical Surfaces: Grade HGS
    - c. Edges: Grade HGS
  3. Finish - Semi-Exposed Surfaces:
    - a. Surfaces other than drawer bodies: Thermally Fused Laminate (TFL); melamine
      - i. Edges of Plastic Laminate Shelves: Grade HGS.
      - ii. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of:  
Thermally Fused Laminate (TFL); melamine
  4. Drawer Sides and Backs: Solid-hardwood lumber.
  5. Drawer Bottoms: Hardwood plywood
  6. Finish - Concealed Surfaces: Manufacturer's option.
  7. Door and Drawer Front Edge Profiles: Grade HGS.
  8. Casework Construction Type: Type A – Frameless.
  9. Interface Style for Cabinet and Door: Style 1 – Overlay; flush overlay.
  10. Adjustable Shelf Loading: 50 lbs. per sq. ft.
    - a. Deflection: L/144.
- 2.03 LAMINATE MATERIALS
- A. Manufacturers:
1. Formica Corporation: [www.formica.com](http://www.formica.com).
  2. Basis of Design: Wilsonart LLC: [www.wilsonart.com](http://www.wilsonart.com).
  3. Substitutions: See Section 01 25 00 – Substitution Procedures.
- B. Thermally Fused Laminate (TFL): Melamine resin, NEMA LD 3, Type VGL laminate panels.
1. Manufacturers:
    - a. Formica Corporation: [www.formica.com](http://www.formica.com).
    - b. Wilsonart LLC: [www.wilsonart.com](http://www.wilsonart.com).
    - c. Substitutions: See Section 01 25 00 – Substitution Procedures.
- C. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.
- D. Provide specific types as indicated.
1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness.
  2. Horizontal Surfaces: HGL, 0.039 inch nominal thickness.
  3. Vertical Surfaces: VGS, 0.028 inch nominal thickness.
  4. Vertical Surfaces: VGL, 0.020 inch nominal thickness.
  5. Post-Formed Horizontal Surfaces: HGP, 0.039 inch nominal thickness.
  6. Post-Formed Vertical Surfaces: VGP, 0.028 inch nominal thickness.
  7. Flame Retardant Surfaces: HGF, 0.048 inch nominal thickness.
  8. Cabinet Liner: CLS, 0.020 inch nominal thickness, through color, white color, finish as indicated.
  9. Laminate Backer: BKL, 0.020 inch nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.

2.04 COUNTERTOPS

- A. Countertops, other than plastic laminate, are specified in Section 12 36 00.
- B. Plastic Laminate Countertops: Medium density fiberboard substrate covered with HPDL, conventionally fabricated and PLAM-edge banded.

2.05 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
  - 1. VOC limits:
    - a. Wood glues: 30 g/L.
    - b. Multi-purpose construction adhesives: 70 g/L.
    - c. Contact adhesives: 250 g/L.
  - 2. Manufacturers:
    - a. Franklin International, Inc; Titebond Original Wood Glue: [www.titebond.com](http://www.titebond.com).
    - b. Substitutions: See Section 01 25 00 – Substitution Procedures.
- B. Fasteners: Size and type to suit application.
- C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
- D. Concealed Joint Fasteners: Threaded steel.
- E. Grommets: Standard plastic for cut-outs, in color noted on finish schedule.

2.06 HARDWARE

- A. Manufacturers:
  - 1. Knape & Vogt: [www.knapeandvogt.com](http://www.knapeandvogt.com).
  - 2. Stanley Hardware: [www.stanleyhardwarefordoors.com](http://www.stanleyhardwarefordoors.com).
  - 3. Stylmark: [www.stylmark.com](http://www.stylmark.com).
- B. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.
- C. Adjustable Shelf Supports:
  - 1. Injection molded clear polycarbonate. Incorporate integral molded lock tabs to retain shelf from tipping or inadvertent lift out.
  - 2. Supports shall have 5 mm diameter double pin engagement into precision bored cabinet vertical hole patterns.
  - 3. Vertical Adjustment: 1 1/4 inch (32 mm).
  - 4. Provide supports with compression ridge effecting force against shelf edge to maintain positive pin engagement.
  - 5. Provide supports with molded-in screw attachment feature.
  - 6. Static Test Load: Minimum, 200 lb. per clip.
  - 7. Shelf Spans Less than 27 inches: Provide 4 shelf-end supports.
  - 8. Shelf spans greater than 27 inches: Provide 5 supports with backs drilled to receive a mid-span shelf support.
  - 9. Clip Angles: Stainless steel.
- D. Fixed Specialty Workstation Brackets:
  - 1. Material: Steel.
  - 2. Finish: Manufacturer's standard, factory-applied powder coat.
  - 3. Color: Selected by MBI Companies from manufacturer's full range.
  - 4. Manufacturers:
    - a. Basis of Design: Rakks/Rangine Corporation; EH Series Brackets: [www.rakks.com](http://www.rakks.com).
    - b. Substitutions: See Section 01 25 00 – Substitution Procedures.
- E. Fixed Americans with Disabilities Act (ADA)-Compliant Vanity and Countertop Brackets:

1. Material: Steel.
  2. Finish: Manufacturer's standard, factory-applied primer.
  3. Finish: Manufacturer's standard, factory-applied, textured powder coat.
  4. Color: Selected by MBI Companies from manufacturer's full range.
  5. Products:
    - a. A&M Hardware, Inc ; ADA Vanity Brackets: <http://www.aandmhardware.com>.
    - b. Rakks/Rangine Corporation; ADA Compliant Rakks EHV Vanity Supports: [www.rakks.com](http://www.rakks.com).
    - c. Substitutions: See Section 01 25 00 – Substitution Procedures.
- F. CPU Shelf Bracket:
1. Basis of Design: RoHS Wall Mount Desktop CPU Bracket; [cablewholesale.com](http://cablewholesale.com).
- G. Drawer and Door Pulls: As shown on finish schedule.
- H. Cabinet Locks: Keyed disc tumbler, keyed alike, master keyed, steel with satin chrome finish.
1. Hinged doors and drawers: National Lock; No. M4-7054.
  2. Sliding Panel Doors:
    - a. 13/16 inch (20.6 mm) thick: National Lock; No. M4-0057.
    - b. 1/4 inch (6.4 mm) thick: National Lock; No. M2-0225.
  3. Locate locks as indicated on drawings.
- I. Catches: Provide top mounted magnetic catches with opening resistance in compliance with ADA standard.
1. Products:
    - a. Hafele; [www.hafele.com](http://www.hafele.com).
    - b. Knappe & Vogt; [www.knappeandvogt.com](http://www.knappeandvogt.com).
    - b. Stanley Hardware; [www.stanleyhardwarefordoors.com](http://www.stanleyhardwarefordoors.com).
  2. Base and Wall Cabinet Doors: Top-mounted catch.
    - a. Tall Cabinet Door: Provide two catches at each door.
  3. Catch Housing: White.
- J. Drawer Slides:
1. Type: Full extension.
  2. Static Load Capacity: Heavy Duty grade.
  3. Mounting: Side mounted.
  4. Stops: Integral type.
  5. Features: Provide self closing/stay closed type.
  6. Manufacturers:
    - a. Accuride International, Inc; Heavy-Duty Drawer Slides: [www accuride.com](http://www accuride.com).
    - b. Blum: [www.blum.com/us/en](http://www.blum.com/us/en).
    - c. Knappe & Vogt Manufacturing Company; #1429, full extension: [www.knappeandvogt.com](http://www.knappeandvogt.com).
    - d. Substitutions: See Section 01 25 00 – Substitution Procedures.
- K. Hinges: Frameless European style concealed 170-degree opening, self-closing type, steel with brushed steel finish.
1. Manufacturers:
    - a. Blum; [www.blum.com/us/en](http://www.blum.com/us/en).
    - b. Grass America Inc; G393: [www.grassusa.com](http://www.grassusa.com).
    - c. Hafele America; [www.hafele.com/us/en](http://www.hafele.com/us/en).
    - d. Hettich America, LP; [www.hettich.com/en-us/home.jsp](http://www.hettich.com/en-us/home.jsp).
    - e. Substitutions: See Section 01 25 00 – Substitution Procedures.
- 2.07 SHOP TREATMENT OF WOOD MATERIALS
- A. Provide UL (DIR) listed and approved identification on fire retardant treated material.
- B. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

2.08 FABRICATION

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
  - 1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
  - 2. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- E. Mechanically fasten back splash to countertops as recommended by laminate manufacturer at 16 inches on center.
- F. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.
- G. Shop glaze glass materials using the Interior Dry method as specified in Section 08 80 00.

2.09 SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. For opaque finishes, apply wood filler in exposed nail and screw indentations and sand smooth.
- C. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI (AWS) requirements for grade indicated.
- B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- C. Use fixture attachments in concealed locations for wall mounted components.
- D. Use concealed joint fasteners to align and secure adjoining cabinet units.
- E. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- F. Secure cabinets to floor using appropriate angles and anchorages.
- G. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.03 ADJUSTING

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION



## PART 1 GENERAL

### 1.01 SCOPE

- A Waterproofing and dampproofing.
- B. In general, this section shall include the following:
  - 1. Waterproofing membrane and protection course at all walls below grade.
  - 2. Mastic dampproofing on CMU walls behind brick veneer.
  - 3. Mastic dampproofing on CMU walls behind insulated metal panels.

### 1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.
- B Section 03 30 00 - Cast-in-Place Concrete: For under-slab vapor barrier.

### 1.03 SUBMITTALS

- A Submit manufacturer's specifications and installation instructions for waterproofing membrane, waterstops, and protection board.

### 1.04 PROJECT CONDITIONS

- A Provide a suitable area for storage of dampproofing materials and equipment. Store asphalt emulsion containers on end on wood or other clean rigid pad, to prevent adherence of foreign material.
- B Any work or materials damaged during the handling and application of asphalt emulsion shall be restored to original condition or replaced at no additional cost to the Owner.

### 1.05 GUARANTEE

- A All areas waterproofed are to be guaranteed during the one (1) year guarantee period. Any water leakage covered herein is to be repaired at the contractor's expense.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A Waterproofing of wall areas below grade and decks above finished space shall be Bituthene System 4000 Waterproofing System as manufactured by Grace Construction Products, Mel-Rol® Waterproofing System as manufactured by W. R. Meadows, Inc. or approved equal.
  - 1. Membrane shall be Bituthene 4000 Waterproof Membrane or approved equal.
    - a. Thickness 1/16 in. (1.5 mm) nominal ASTM D3767—method A
    - b. Flexibility, 180° bend over 1 in. (25 mm) mandrel at -25°F (-32°C) Unaffected ASTM D1970
    - c. Tensile strength, membrane, die C 325 lbs/in.2 min. ASTM D412 modified1
    - d. Tensile strength, film 5,000 lbs/in.2 min. ASTM D882 modified1
    - e. Elongation, ultimate failure of rubberized asphalt 300% min. ASTM D412 Modified
    - f. Crack cycling at -25°F (-32°C), Unaffected 100 cycles ASTM C836
    - g. Lap adhesion at minimum application

- |    |  |                                  |
|----|--|----------------------------------|
|    | temperature: 5 lbs/in. (880 N/m)                         | ASTM D1876 modified <sup>2</sup> |
| h. | Peel strength: 9 lbs/in. (1576 N/m)                      | ASTM D903 modified <sup>3</sup>  |
| i. | Puncture resistance, membrane:<br>50 lbs (222 N) minimum | ASTM E154                        |
| j. | Resistance to hydrostatic head<br>210 ft (70 m) of water | ASTM D5385                       |
| k. | Permeance 0.05 perms maximum<br>method                   | ASTM E96, section 12—water       |
| l. | Water absorption 0.1% maximum                            | ASTM D570                        |
2. Surface treatment shall be Bituthene Surface Conditioner.
3. All waterproofing on walls below grade shall be protected by Bituthene Protection Board.
- B Mastic dampproofing shall be asphalt emulsion type equal to Karnak 200 fibrated, manufactured by Karnak Chemical Corporation, Air-Shield™ LMP by W.R. Meadows, or Hydrocide 700 semi-mastic manufactured by Sonneborn Building Products, Division Contech, Inc.

### PART 3 EXECUTION

#### 3.01 SURFACE PREPARATION

- A Surfaces to receive waterproofing shall be clean, dry, and free of voids, loose aggregate scale, and sharp projections.

#### 3.02 INSTALLATION OF WATERPROOFING ON WALLS

- A Place Z-strips at footings.
- B At deck applications, adhere tape to wall to depth equivalent to the thickness of wearing slab.
- C Install waterproofing sheets as recommended by manufacturer.
- D Tape joints as recommended by manufacturer.
- E Clean and prepare subsurfaces in accordance with waterproofing manufacturers requirements.
- F Cover waterproofing on exterior walls with polystyrene on impaling pins.

#### 3.03 INSTALLATION OF WATERSTOPS

- A Install in all walls below grade to bridge the gap between the wall and the slabs on grade.
- B All splicing connections shall be made in accordance with manufacturers recommendations.

#### 3.04 INSTALLATION OF DAMPPROOFING

- A Apply mastic dampproofing to exterior face of exterior masonry wall which are to receive brick veneer or insulated metal panels, in one full coat over the block.
- B Fill all cracks, crevices, and pores of concrete. Make sure coating is continuous and free from breaks and pinholes.
- C Dampen the dry concrete surfaces and keep surface damp ahead of application.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

- A. Furnish and install thermal insulation at all exterior cavity walls and batt insulation and insulation where noted on the drawings.

1.02 RELATED DOCUMENTS

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section 05 40 00 - Cold Formed Metal Framing  
Section 09 21 16 - Gypsum Board Assemblies  
Section 09 51 00 – Acoustical Tile Ceilings

1.03 SUBMITALS

- A. Submit product data for all insulation products.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect foam-plastic board insulation as follows:
  - 1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
  - 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
  - 3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 PRODUCTS

2.01 MATERIAL

- A. Insulation for exterior metal stud walls shall be 6" (R-19) FSK faced fiberglass batt insulation ASTM C665 Type III, Class A with attachment flanges on paper backing. Insulation shall be sized for friction fit between studs.
- B. Batt insulation at roof trusses shall be 9-1/2 inch (R-30) unfaced fiberglass batt insulation ASTM C 665 Type II, Class A. Rigid Insulation at roofs
- C. Batt insulation not covered by gypsum wallboard, or other code-approved substrate, shall be foil-faced, fire-resistant batt insulation complying with ASTM C 665, Type III, Class A, Category 1. Surface burning characteristics: Maximum flame spread: 25; Maximum smoke developed: 50, when tested in accordance with ASTM E 84.
- D. Sound Attenuation insulation shall be 3-1/2 inch thick unfaced fiberglass acoustical insulation complying with ASTM C 665 Type I. Surface burning characteristics: Maximum flame spread: 10; Maximum smoke developed: 10, when tested in accordance with ASTM E 84. Combustion Characteristics: Passes ASTM E 136 test. Fire resistance rating: Passes ASTM E 119 test.
- E. Sound insulation above acoustic tile ceilings shall be 6-1/4" sonobat insulation (Unfaced fiberglass batt insulation ASTM C665 Type I provided in 24" wide rolls for installation above acoustical ceilings)

- F. Perimeter foundation insulation shall be 1-1/2" thick rigid closed-cell board complying with ASTM C-578 Type IV with the following properties:
1. Compressive Strength: 25 psi minimum
  2. Flexural Strength: 50lbs/in<sup>2</sup> min (ASTM C 203)
  3. Thermal Resistance: 5 year aged R-values of 5.4 and 5.0 min. °F-ft<sup>2</sup>-h/Btu<sup>2</sup>/inch at 40°F and 75°F respectively (ASTM C 518).
  4. Water Absorption: max. 0.1% by volume (ASTM C 272).
  5. Water Vapor Permeance: 1.1 perm-inch max.
  6. Dimensional Stability: 2% max. linear change (ASTM D2126).
  7. Flame Spread: 5 (ASTM E 84).
  8. Smoke Developed: 45 to 165 (ASTM E84)
  9. Size: manufacturer's standard lengths and widths.
  10. Approved manufacturers include:
    - a. DiversiFoam Products.
    - b. Dow Chemical Company.
    - c. Owens Corning.
    - d. Pactiv, Building Products Division.
- G. Insulation for furred masonry walls "Z" furring shall be 1-1/2" thick rigid closed-cell board complying with ASTM C-578 Type IV with the following properties:
1. Compressive Strength: 15 psi minimum
  2. Flexural Strength: 40lbs/in<sup>2</sup> min (ASTM C 203)
  3. Thermal Resistance: 5 year aged R-values of 5.4 and 5.0 min. °F-ft<sup>2</sup>-h/Btu<sup>2</sup>/inch at 40°F and 75°F respectively (ASTM C 518).
  4. Water Absorption: max. 1.1% by volume (ASTM C 272).
  5. Water Vapor Permeance: 1.1 perm-inch max.
  6. Dimensional Stability: 2% max. linear change (ASTM D2126).
  7. Flame Spread: 5 (ASTM E 84).
  8. Smoke Developed: 45 to 165 (ASTM E84)
  9. Size: Furnished in boards 23-7/8" wide by manufacturer's standard lengths.
  10. Approved manufacturers include:
    - a. DiversiFoam Products.
    - b. Dow Chemical Company.
    - c. Owens Corning.
    - d. Pactiv, Building Products Division.
- H. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.

## 2.02 VAPOR RETARDER

- A. Polyethylene Vapor Retarder: 4-mil film ASTM D 4397 with vapor transmission rating of 0.2 perms where noted on the drawings.

## PART 3 EXECUTION

### 3.01 GENERAL

- A. Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or that interfere with insulation attachment.
- B. Comply with insulation manufacturer's written instructions applicable to products and application indicated.

- C. Install insulation that is undamaged, dry, unsoiled, and has not been exposed at any time to ice or snow.
- D. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections that interfere with placement.
- E. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

### 3.02 INSTALLATION OF VAPOR RETARDERS

- A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Before installing vapor retarder, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
- C. Firmly attach vapor retarders to metal framing and solid substrates with vapor-retarder fasteners as recommended by vapor-retarder manufacturer.
- D. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.
- E. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

### 3.03 INSTALLATION OF BATT INSULATION

- A. Install sound insulation in walls around rooms and above ceilings as shown on the drawings. Whether or not shown in drawings, install sound insulation in walls around, and above ceilings in, ALL restrooms, offices, conference/meeting rooms, mechanical rooms and any room with a computer server, voltage transformer or dimming rack.
- B. Set vapor-retarder faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces except for firestopping.
- C. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
- D. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:
  - 1. Use blanket widths and lengths that fill cavities formed by framing members. Where more than one length is required to fill the cavity, provide lengths that will produce a snug fit between studs.
  - 2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
  - 3. For wood framed construction with faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to produce air tight installation after concealing finish is in place.
  - 4. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces not large enough to receive batts. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.

3.04 INSTALLATION OF RIGID INSULATION AT FURRED MASONRY WALLS

A. Install wall insulation as follows:

1. Install insulation boards vertically against backup wythe of masonry. Wedge insulation boards tightly between rows of metal furring stripes.
2. Cut insulation by means of saw, knife, or similar sharp tool to fit around obstructions across the cavity such as vents, louvers, pipe, and conduit. Cut insulation to 8" widths and bevel edges to seal tightly at radius corners.
3. Coordinate the installation of insulation with the masonry work. Be sure the dampproofing or waterproofing is in place on face of backup before insulation is installed.

3.05 CLEAN UP

- A. Remove all debris and unused insulation products from the site.

3.06 PROTECTION

- A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES:

- A. Furnish all materials, equipment, labor and supervision necessary to provide and install Open, and, Closed Cell Spray Polyurethane Foam (SPF) where indicated on the drawings and as specified herein.

1.02 RELATED DOCUMENTS:

- A. Applicable provisions of the General Conditions, Supplementary Conditions, and Division 1 General Requirements, apply to the work under this section.

Section 07 92 00 – Joint Sealants.

1.03 REFERENCES:

- A. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- B. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- C. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.
- D. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- E. ASTM D 1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
- F. ASTM D 1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
- G. ASTM D 6226 - Standard Test Method for Open-Cell Content of Rigid Cellular Plastics.
- H. AATCC 127 - Water Resistance: Hydrostatic Pressure Test.

1.04 PERFORMANCE REQUIREMENTS:

- A. Conform to applicable code for flame and smoke, concealment, and over coat requirements.

1.05 SUBMITTALS:

- A. Submit under provisions and requirements of Division 1.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.06 QUALITY ASSURANCE:

- A. Manufacturer Qualifications: Company specializing in manufacturing urethane foam products and systems of this section with minimum ten years documented experience.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years documented experience.
  - 1. Installer must be a certified spray foam insulation contractor or have manufacturer's certification

- for the application.
2. Installer shall provide the equipment required by the manufacturer for proper installation including high pressure plural component proportioning pump, heated hoses of suitable length, spray gun, drum pumps or other material feeding system, and other ancillary equipment required for the Work.
- 1.07 DELIVERY, STORAGE, AND HANDLING:
- A. Strictly adhere to all of the manufacturer's instructions regarding delivery, storage and handling.
- B. Store products under cover in manufacturer's unopened and labeled packaging until ready for installation.
- C. Storage temperatures should not exceed 90 degrees F (32.22 degrees C). Do not store in direct sunlight.
- D. Keep the temperature of the chemicals above 70 degrees F (21.66 degrees C) for several days prior to use. Cold chemicals can cause pump cavitations and incorrect metering. Keep drums tightly closed when not in use and under dry gas pressure of 2-3 psi after they have been opened.
- E. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
- 1.08 COORDINATION:
- A. Ensure that the installation of products of this section is coordinated with affected trades to prevent interruption of construction progress.
- 1.09 PROJECT CONDITIONS:
- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Do not install spray polyurethane foam during precipitation or when precipitation is imminent. Do not install when the ambient temperature is less than 50 degrees F (10 degrees C) without specific authorization of the manufacturer. Do not install when the ambient humidity exceeds the manufacturer's limits.
- 1.10 PRE-INSTALLATION MEETING:
- A. Convene pre-installation meeting to review installation sequence and scheduling a minimum of two weeks prior to commencing SPF work.
- B. Attendance: Architect, Contractor, framer, wall finish applicator and SPF applicator.

## PART 2 PRODUCTS

- 2.01 PRODUCT:
- A. Insulation shall be Lapolla AirTight polyurethane insulation as manufactured by Lapolla Industries Inc., 15402 Vantage Parkway East, Houston, TX 77032; Ph: 888-452-7655; Fax: 281-219-4102; [www.lapolla.com](http://www.lapolla.com).
- B. Subject to compliance with specified requirements, acceptable alternate manufacturers include the following:
1. Demilec (USA) LLC, 2925 Galleria Drive, Arlington, TX 76011; Ph: 817-640-4900; Fax: 817-633-2100; [www.demilecusa.com](http://www.demilecusa.com).
  2. NCFI Polyurethanes, Mount Airy Industrial Park P. O. Box 1528, Mount Airy, NC 27030; Ph: 336-789-9161; [www.insulquiet.com](http://www.insulquiet.com).

3. BASF Polyurethane Foam Enterprises LLC, 1703 Crosspoint Ave., Houston, TX 77054, Ph: 713-796-9743 Fax: 713-383-4590, www.basf-pfe.com.
4. CertainTeed Corporation, P.O. Box 860, Valley Forge, PA 19482-0105, Ph: 610-341-7000, 800-233-8990, Fax: 610-341-7571, www.certainteed.com.
5. Other manufacturers submitted and approved in accordance with provisions of Division 01.

2.03 MATERIALS:

- A. Closed Cell (CC) Spray Polyurethane Foam (SPF): High-performance, closed cell spray polyurethane foam (SPF) insulation having the following physical properties:

1. Core Density: 1.8 to 2.3 lbs/ft<sup>3</sup> when tested in accordance with ASTM D 1622.
2. Compressive Strength: 22 psi minimum when tested in accordance with ASTM D 1621.
3. Water Vapor Transmission: Less than or equal to 1.8 perms at 1 inch thick when tested in accordance with ASTM E 96.
4. Closed Cell content: Greater than 90 percent when tested in accordance with ASTM D 6226.
5. Maximum Service Temperature: 180 degrees F (82 degrees C).
6. Air Leakage: Infiltration/exfiltration, 0.004 CF/min/SF at 1.57 psf when tested in accordance with ASTM E 283.
7. Water Resistance: No Failure at greater than 40 foot Head Pressure when tested in accordance with AATCC 127.
8. Flammability Characteristics: Class I (with Flame Spread less than 25 and smoke developed less than 450) when tested in accordance with ASTM E 84.
9. Aged R-Value: 6.3 Minimum per 1 inch (25 mm) thickness when tested in accordance with ASTM C 518.

- B. Open Cell (OC) Spray Polyurethane Foam (SPF): High-performance, open cell spray polyurethane foam (SPF) insulation having the following physical properties:

1. Core Density: 0.4 to 0.6 lbs/ft<sup>3</sup> when tested in accordance with ASTM D 1622.
2. Tensile Strength: 3 psi minimum when tested in accordance with ASTM D 1623.
3. Water Vapor Transmission: Less than or equal to 22 perms at 1 inch thick when tested in accordance with ASTM E 96.
4. Open Cell content: Greater than 94 percent when tested in accordance with ASTM D 2856.
5. Sound Transmission: Class 41 when tested in accordance with ASTM E 413-2004; 0.10 Noise Reduction Coefficient.
6. Air Leakage: Infiltration/exfiltration, less than 0.02 L/s/M<sup>2</sup> at 4.5 inches when tested in accordance with ASTM E 283-04.
7. Flammability Characteristics: Class I (with Flame Spread less than 25 and smoke developed less than 450) when tested in accordance with ASTM E 84.
8. Aged R-Value: 3.9 Minimum per 1 inch (25 mm) thickness when tested in accordance with ASTM C 518.

2.04 MISCELLANEOUS MATERIALS:

- A. Thermal Barrier: Equal to intumescent fire resistant coating, water based and with no VOCs, equal to Flame Seal -TB™ Thermal Barrier for Polyurethane Foam Insulation as manufactured by Specialty Products, Inc., 2410 - 104th St. Ct. S., Suite D, Lakewood, WA 98499, 253-588-7101.

1. Film Thickness: 25 wet mils (thermal barrier).

- B. Joint Filler Foam: Hilti CF 124 Filler Foam or equivalent.

- C. Sealant: Sikaflex 1a: Single component polyurethane or equivalent.

- D. Foam Repair Kit: Handi-Foam two part kits from Fomo Products, or Touch n' Seal 2 component systems from Convenience Products, or other equivalent kits.

- E. Moisture Detection Paper Strips: MDP Strips manufactured by NCFI Polyurethanes, Mount Airy, NC or equivalent.

### PART 3 EXECUTION

#### 3.01 EXAMINATION:

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

#### 3.02 PREPARATION:

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Proceed with spray polyurethane foam application only after substrate construction, substrate penetration work, and related electrical and plumbing work has been completed.
- D. Remove sawdust and other debris from areas to be sprayed by blowing with compressed air or vacuuming with a shop vacuum.
- E. All metal to which foam is to be applied must be free of oil, grease, rust, etc. Primers should be used where necessary.
- F. Verify that substrate is dry by checking surface for moisture with Moisture Detection Paper strips.
- G. Fill voids greater than 2 inches (51 mm), with mineral wool or a backer gypsum board cut to fit in the void, and then spray over the backer material.
- H. Mask off all areas not to receive spray foam with masking tape and plastic sheeting. Apply release agent to stud facing to facilitate removal of foam.
- I. At the start of work, spray-apply SPF to an area of approximately 100 sf (9.29 sm) at the specified thickness. Proceed with work only after ensuring proper foam thickness and full adhesion to the substrate.

#### 3.03 INSTALLATION:

- A. Install in strict accordance with manufacturer's instructions.
- B. All surfaces to be sprayed with SPF must be free of all moisture and ice.
- C. Do not apply SPF during inclement weather or when ambient temperature and humidity are outside the ranges prescribed by the manufacturer.
- D. Apply the SPF where indicated on the Drawings and as indicated below:
  - 1. **Exterior Stud Walls:** Apply to a minimum thickness to produce the minimum R-value indicated on the drawings. Closed Cell (CC) SPF or Open Cell (OC) SPF to the interior face of the exterior sheathing, unless average thickness is otherwise specified on the Drawings.
  - 2. **Exterior Block Walls:** Apply to a minimum thickness of 2" or to a thickness to produce the minimum R-value indicated on the drawings (whichever is greater), Closed Cell (CC) SPF to the exterior face of the exterior block walls, unless average thickness is otherwise specified on the Drawings. Coat with UV protectant paint if SPF will be left exposed longer than one week.

3. **Exterior Concrete Panel Walls:** Apply to a minimum thickness of 2" or to a thickness to produce the minimum R-value indicated on the drawings (whichever is greater), Closed Cell (CC) SPF to the interior face of the exterior concrete panel walls, unless average thickness is otherwise specified on the Drawings.
  4. **Roofline:** Apply to a minimum thickness to produce the minimum R-value indicated on the drawings. Closed Cell (CC) SPF or Open Cell (OC) SPF to the underside of the roof decking, unless average thickness is otherwise specified on the Drawings.
  5. **Interior Stud Partitions:** Apply 4" ( $\pm 1/2$ ") Open Cell (OC) SPF sound deadening to the interior face of gypsum wallboard (second side of partition must be installed after foaming is complete).
  6. **Under Floors:** Apply 4" ( $\pm 1/2$ ") Open Cell (OC) SPF sound deadening to the underside of floor structure, unless average thickness is otherwise specified on the Drawings.
  7. **At steel tube beams and columns:** Pre-drill holes where indicated or as acceptable to steel designer, insert spray nozzle into holes and completely fill inside void of steel members with Open Cell (OC) SPF. Ensure that void is 100% filled by drilling air relief holes where needed.
  8. **At door and window jambs and headers with multiple metal framing members:** Insert spray nozzle into holes and completely fill inside void of steel members with Open Cell (OC) SPF.
- E. Apply SPF using a "picture framing" technique: apply a cant of foam between the substrate and the structure/framing. Then spray-apply the required thickness of foam against the substrate. Apply the foam 2 inches thick maximum for each pass, using multiple passes to achieve the desired thickness.
- F. Do not apply SPF to fill voids around doors and windows. Use low-expansion foam for those applications.
- G. Apply SPF to fill voids around accessible service and equipment penetrations in non fire rated conditions.
- H. Seal plumbing stacks, electrical wiring and other penetrations into attic to control air leakage not otherwise specified to be sealed by those subcontractors.
- I. Remove overspray from adjacent surfaces.
- L. Where damage occurs which violates the spray foam's air seal and moisture seal, repair as needed using the specified spray polyurethane material or the specified foam repair kit material.
- 3.04 ACCESSORY APPLICATION:
- A. Apply Thermal Barrier Coating where required by code:
1. Apply coating with airless spray equipment, brush or roller, in strict accordance with manufacturer's written instruction.
- B. Joint Filler Foam and Caulk:
1. Use joint filler foam and/or caulk to seal around windows, doors, chimneys, electrical raceways, sill plates, multiple studs, etc. Note that the expansion of joint filler foam in a confined space can tighten window frames and door jambs to the point that they will not open or close properly. Care must be used in these areas to avoid distortion of these members.
- 3.05 PROTECTION:
- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

3.06 CLEANING:

- A. Remove excess SPF.
- B. Replace defective SPF.
- C. Clean soiled surfaces with cleaning solution.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

- A Furnish and install interior liner fabric, support strapping, fasteners, thermal break materials and thermal insulation of the appropriate type to insulate the roof and wall areas of the Metal Building System to the full designed R-values of the building as specified and as shown on the drawings. Metal building insulation system shall be furnished and installed by the metal building contractor.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section 07 21 00 - Building Insulation

1.03 QUALITY ASSURANCE

- A Provide materials in original unopened manufacturer's packages together with detailed instruction and shop drawings typical of the installation. Materials shall be inspected for damage or shortage upon delivery and stored in a dry, secure manner. Installation shall proceed with care to insure proper sealing of the liner fabric. Insulation shall be placed on or behind the liner fabric, in the full specified thickness without voids or compression. On-site installation training shall be provided, if necessary to assure proper installation. Nor changes or substitutions will be allowed unless submitted in accordance with Section 01300. Substitutions of systems that do not have a continuous vapor barrier inside of the purlins, girts, and insulation will not be allowed. Purlin, girts, and insulation must be completely isolated from the inside conditioned air.

- B All exposed parts of the system shall have flame spread of 25 or less and smoke developed of 50 or less based on ASTM E84 standards. Vapor barrier fabric shall be opaque white or colored woven reinforced polyethylene with extrusion-welded seams fabricated to fit the full bay length by width of the building. Buildings more than 100 feet wide may have field seams on the bottom of a ridge purlin or no less than 50 feet apart. All field seams must be sealed with vapor barrier lap sealant. Wall bays shall have not less than one entire wall bay or end wall column space from ceiling to floor. Edges of the vapor barrier fabric shall be trimmed and sealed to the adjoining steel or fabric.

1.04 SUBMITTALS

- A Submit shop drawings showing material layout and connection in accordance with Section 01300.

PART 2 PRODUCTS

2.01 GENERAL

- A Acceptable systems:

1. Simple Saver System for New Pre-Engineered Metal Buildings as manufactured by Thermal Design, P.O. Box 468, Madison, NE 68748, Phone: 800-255-0776
2. Energy Saver FP as manufactured by GBP Silvercote, 29200 Fountain Parkway, Solon, OH 44139, 800-231-6200
3. Sealed N Safe Full Cavity System as manufactured by Sealed N Safe, 320 West 100 North, Ephraim, UT 84627, 888-340-4767
4. OptiLiner Banded Liner System as manufactured by Owens Corning Insulating Systems, LLC, One Owens Corning Parkway, Toledo, OH 43659, Phone: 800-438-7465

5. Other systems/manufacturers approved by Architect prior to bidding.
- B Roof system shall be a multi-layer installation with thermal break with a minimum "in-place" insulation R value of (R-30).
- C Wall systems shall be a single layer system with thermal break applied to the girts between the wall panels and the outer flange. The minimum "in-place" insulation R value of the wall insulation shall be (R 19).

## 2.02 MATERIALS

- A Steel Strap: 100 KSI tempered, high-tensile-strength steel, galvanized, primed and painted on the exposed side. Minimum size shall be .015 inch by ¾ inch by continuous length. Color shall be selected by the Architect from the manufacturer's standard colors.
- B Fasteners: #12 x ¾ inch plated Tek 2 screws painted to match the specified color for light gauge steel. @12 x 1-1/4 inch plated Tek 4 screws painted to match the specified color for heavier gauge steel. Fasteners for wood, concrete, and other surfaces shall be appropriate to the material being fastened to.
- C Vapor Barrier Liner Fabric:
1. At Gymnasium: Provide super-white fabric on roof. Provide Utility Saver Grade Fabric at walls. Fabric shall be woven reinforced high-density polyethylene yarns coated on the exposed side with a continuous white or colored polyethylene film. Material shall be manufactured in large custom pieces by extrusion welding of roll goods. Pieces shall be fabricated to substantially fit large defined building areas with minimum practical sealing to be done on job site. Fabric shall be folded to allow for rapid pull-out on the strap support system. Color White. Fabric perm rating shall be 0.025. Seams in the fabric shall have the same perm rating as the fabric. Stapled seams are not acceptable.
  2. At balance of pre-engineered metal building frame: Provide Utility Saver Grade Fabric at roof, walls and soffits. Fabric shall be woven reinforced high-density polyethylene yarns coated on the exposed side with a continuous white or colored polyethylene film. Material shall be manufactured in large custom pieces by extrusion welding of roll goods. Pieces shall be fabricated to substantially fit large defined building areas with minimum practical sealing to be done on job site. Fabric shall be folded to allow for rapid pull-out on the strap support system. Color: White. Fabric perm rating shall be 0.025. Seams in the fabric shall have the same perm rating as the fabric. Stapled seams are not acceptable.
- D Sealant: Fast track solvent-based, synthetic rubber adhesive for sealing vapor barrier laps.
- E Insulation: Fiberglass blanket or batt insulation meeting Federal specifications HH-I-558B, Form B, Type 1 or other insulation form submitted by the manufacturer and approved.
- F Thermal Block: 1 inch thick by 3 inch wide, white, closed-cell polyethylene foam with pre-applied adhesive film and peel-off backing. Polystyrene snap-on thermal blocks may be used in lieu of the above.

## PART 3 EXECUTION

### 3.01 COORDINATION

- A Coordinate installation of insulation system with erection of metal building system to allow all parties to properly place their work.

### 3.02 ROOF INSULATION SYSTEM

- A Install roof insulation as follows:

1. Cut to length and install painted steel straps in the pattern and spacings as shown on the project shop drawings. The straps are installed in tension and span immediately below the bottom plane of the purlins.
2. Position the pre-folded vapor barrier fabric on the strap platform along one eave purlin. Clamp the two bottom corners at the eave and also centered on the bay. Pull the other end of the pleat folded fabric across the building width on the strap platform but below the purlins, pausing only at the ridge to fasten the straps and fabric in position where the plane of the roof changes and to release temporary fasteners on the opposite ridge purlin. Once positioned, the fasteners are installed from the bottom side at each strap-purlin intersection and the edges are trimmed and sealed along the rafters.
3. Insulation is unpacked and placed on the vapor liner system being sure to shake to a thickness exceeding the specified thickness. It is important that the insulation cavity be filled to minimize the probability of condensation.
4. Thermal blocks must be installed on purlins before metal roof panels are installed.

### 3.03 WALL INSULATION SYSTEM

A Install wall insulation system as follows:

1. Spot glue 6" batt insulation to exterior panels then fasten vapor barrier liner fabric to girts and other framing with self-drilling fasteners with washers at manufacturer's recommended spacing.

### 3.04 CLEAN UP

A Remove all debris and unused insulation products from the site.

END OF SECTION



## PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. Vapor permeable, fluid-applied membrane air barriers (infiltration barriers).

### 1.02 RELATED DOCUMENTS

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.
  - 1. Section 07 62 00 - Sheet Metal Flashing and Trim.
  - 2. Section 07 92 00 - Joint Sealants.

### 1.03 SUMMARY

- A. This Section includes the following:
  - 1. Materials and installation methods for fluid-applied vapor permeable air barrier membrane system located in the non-accessible part of the wall.
  - 2. Materials and installation methods to bridge and seal air leakage pathways in roof and foundation junctions, window and door openings, control and expansion joints, masonry ties, piping, and other penetrations through the wall assembly.

### 1.04 DEFINITIONS

- A. Air Barrier Assembly: The collection of air barrier materials and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

### 1.05 PERFORMANCE REQUIREMENTS

- A. General: Provide air barrier capable of performing as a continuous vapor-permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Provide air barrier assemblies capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

### 1.06 AIR BARRIERS

- A. Provide continuous air barrier to control air leakage into, or out of, the conditioned space. Provide air barrier for interior partitions between conditioned space and space designed to maintain temperature or humidity levels which differ from those in the conditioned space by more than 50% of the difference between the conditioned space and design ambient conditions. Provide air barrier with the following characteristics:
  - 1. Continuous, with all joints airtight.
  - 2. Air permeability not to exceed 0.004 cfm/sq. ft. under a pressure differential of 0.3 in. water. (1.57 psf.) (equal to 0.02L/sq. m @ 75 Pa.).
  - 3. Withstand positive and negative combined design wind, fan, and stack pressures on the envelope without damage or displacement and transfer the load to structure. Not to displace adjacent materials under full load.
  - 4. Durable and maintainable.
  - 5. Join air barrier in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep.  
Make connection between:
    - a. Foundation and walls.
    - b. Walls and windows or doors.
    - c. Different wall systems.
    - d. Wall and roof.
    - e. Wall and roof over unconditioned space.

- f. Walls, floor and roof across construction, control, and expansion joints.
  - g. Walls, floors and roof to utility, pipe, and duct penetrations.
6. Make airtight: All penetrations of the air barrier and paths of air infiltration/exfiltration.

#### 1.07 REFERENCES

- A. The following standards and publications are applicable to the extent referenced in the text. The most recent version of these standards is implied unless otherwise stated.
- B. ASTM International:
- 1. C920 Specifications for Elastomeric Joint Sealants
  - 2. C1193 Guide for Use of Joint Sealants
  - 3. D412 Standard Test Methods for Rubber Properties in Tension
  - 4. D570 Test Method for Water Absorption of Plastics
  - 5. D1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting
  - 6. D1876 Test Method for Peel Resistance of Adhesives
  - 7. D1938 Test Method for Tear Propagation Resistance of Plastic Film and Sheeting
  - 8. D1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
  - 9. D4258 Practice for Surface Cleaning Concrete for Coating
  - 10. D4263 Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
  - 11. E96 Test Methods for Water Vapor Transmission of Materials
  - 12. E154 Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
  - 13. E162 Test Method for Surface Flammability of Materials Using a Radiant Heat Source
  - 14. E1186 Practice for Air Leakage Site Detection in Building Envelopes and Air Retarder Systems
  - 15. E2178 Standard Test Method for Air Permeance of Building Materials

#### 1.08 SUBMITTALS

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of air barrier.
- B. Shop Drawings: Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
- 1. Include details of interfaces with other materials that form part of air barrier.
  - 2. Include details of mockups.
- B. Samples:
- 1. Submit representative samples of the following for approval:
    - a. Fluid applied membrane
    - b. Transition tape
    - c. Through Wall Flashing
- D. Product Certificates: For air barriers, certifying compatibility of air barrier and accessory materials with Project materials that connect to or that come in contact with the barrier; signed by product manufacturer.
- E. Qualification Data: For Applicator.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for air barriers, submit certified test report showing compliance with requirements specified for ASTM E2178.
- G. Warranty: Submit a sample warranty identifying the terms and conditions stated in Article 1.10.

1.09 QUALITY ASSURANCE

- A. Manufacturer: Provide air barrier manufactured and marketed by a firm with a minimum of 20 years' experience in the production and sales of waterproofing. Manufacturers proposed for use, but not named in these specifications to submit evidence of ability to meet all requirements specified and include a list of projects of similar design and complexity completed within the past five years.
- B. Applicator Qualifications: A firm experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- C. Mockups: Before beginning installation of air barrier, provide air barrier work for exterior wall assembly mockups, incorporating backup wall construction, external cladding, window, door frame and sill, insulation, and flashing to demonstrate surface preparation, crack and joint treatment, and sealing of gaps, terminations, and penetrations of air barrier membrane.
  - 1. Coordinate construction of mockup to permit inspection by Owner's testing agency of air barrier before external insulation and cladding is installed.
  - 2. If Architect determines mockups do not comply with requirements, reconstruct mockups, and apply air barrier until mockups are approved.
- D. Pre-Installation Conference: Hold conference prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Preinstallation conference to include the Contractor, installer, Architect, and system manufacturer's field representative. Including, but not limited to, the following agenda items:
  - 1. Review of submittals.
  - 2. Review of surface preparation, minimum curing period and installation procedures.
  - 3. Review of special details and flashings.
  - 4. Sequence of construction, responsibilities, and schedule for subsequent operations.
  - 5. Review of mock-up requirements.
  - 6. Review of inspection, testing, protection, and repair procedures.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials and products in labeled packages. 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. Remove damaged material from the site and dispose of in accordance with applicable regulations.
- B. Do not double-stack pallets of fluid applied membrane components on the job site. Provide cover on top and all sides, allowing for adequate ventilation.
- C. Protect fluid-applied membrane components from freezing and extreme heat.
- C. Sequence deliveries to avoid delays but minimize on-site storage.

1.11 PROJECT CONDITIONS

- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air barrier manufacturer. Protect substrates from environmental conditions that affect performance of air barrier. Do not apply air barrier to a wet substrate or during snow, rain, fog, or mist.

1.12 WARRANTY

- A. Material Warranty: Manufacturer's standard form in which manufacturer agrees to replace fluid-applied air barrier membrane materials, that fail within specified warranty period when installed and used in strict conformance with written manufacturer's instructions.

1. Failures include, but are not limited to, the following:
  - a. Failure to maintain air permeance rating not to exceed 0.02 L/s/sq. m. when tested per ASTM E2178, within specified warranty period.
  - b. Failure to maintain a vapor permeance rating greater than 10 perms when tested in accordance with ASTM E96, Method B.
2. Warranty Period: Five years from date of Substantial Completion.

## PART 2 PRODUCTS

### 2.01 FLUID-APPLIED, VAPOR PERMEABLE MEMBRANE AIR BARRIER

- A. Single-Component Acrylic, Fluid-Applied, Vapor-Permeable Membrane Air Barrier subject to compliance with requirements, provide the following:
  1. Perm-A-Barrier VP as manufactured by Grace Construction Products
  2. Air-Shield LMP as manufactured by W. R. Meadows, Inc.
  3. Enershield-HP as manufactured by BASF
  3. Air-Bloc 17MR as manufactured by Henry
  4. Additional alternate products must be approved by Architect prior to bidding.
- B. Physical and Performance Properties: Provide products with the following minimum properties:
  1. Membrane Air Permeance: Not to exceed 0.004 cfm/sq. ft. of surface area (at specified thickness) at 1.57-lbf/sq. ft. pressure difference (0.002 L/s x sq. m of surface area at 75-Pa) when applied to CMU wall; when tested per ASTM E2178.
  2. Membrane Vapor Permeance: Not less than 11.2 perms (649.6 ng/Pa x s x sq. m); when tested per ASTM E96.
  3. UV Exposure Limit: Not more than 150 calendar days; per ASTM D412 and ASTM E96-Method B.

### 2.02 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by air barrier manufacturer for intended use and compatible with air barrier membrane. Liquid-type auxiliary materials to comply with VOC limits of authorities having jurisdiction.
- B. Liquid Membrane for Details and Terminations: Provide Bituthene Liquid Membrane as manufactured by Grace Construction Products, 62 Whittemore Avenue, Cambridge, MA.
- C. Wall Primer (for Use with Throughwall Flashing and Tapes Applied to Substrate): Liquid waterborne primer recommended for substrate by manufacturer of air barrier material.
  1. Flash Point: No flash to boiling point
  2. Solvent Type: Water
  3. VOC Content: Not to exceed 10 g/l
  4. Application Temperature: -4°C (25°F) and above
  5. Freezing point (as packaged): -7°C (21°F)
  6. Product: Perm-A-Barrier WB Primer manufactured by Grace Construction Products.
- D. Flexible Membrane Wall Flashing: 0.8 mm (32 mils) of self-adhesive rubberized asphalt integrally bonded to 0.2 mm (8 mil) of cross-laminated, high-density polyethylene film to provide a min. 1.0 mm (40 mil) thick membrane. Membrane to be interleaved with disposable silicone-coated release paper until installed, conforming with the following:
  1. Water Vapor Transmission: ASTM E96, Method B: 2.9 ng/m<sup>2</sup>sPa (0.05 perms) max.
  2. Water Absorption: ASTM D570: max. 0.1% by weight
  3. Puncture Resistance: ASTM E154: 356 N (80 lbs.) min.
  4. Tear Resistance
    - a. Initiation ASTM D1004: min. 58 N (13.0 lbs.) M.D.
    - b. Propagation ASTM D1938: min. 40 N (9.0 lbs.) M.D.

5. Lap Adhesion at -4°C (25°F): ASTM D1876: 880 N/m (5.0 lbs./in.) of width
  6. Low Temperature Flexibility: ASTM D1970: Unaffected to -43°C (-45°F)
  7. Tensile Strength: ASTM D412, Die C Modified: min. 5.5 MPa (800 psi)
  8. Elongation, Ultimate Failure of Rubberized Asphalt: ASTM D412, Die C: min. 200%.
  9. Product: Perm-A-Barrier Wall Flashing manufactured by Grace Construction Products.
- E. Joint Reinforcing Strip: Air barrier manufacturer's approved tape.
- F. Transition Tape: 0.8 mm (32 mils) of self-adhesive rubberized asphalt integrally bonded to 0.2 mm (8 mil) of cross-laminated, high-density polyethylene film to provide a min. 1.0 mm (40 mil) thick membrane. Membrane to be interleaved with disposable silicone-coated release paper until installed, conforming with the following:
1. Water Vapor Transmission: ASTM E96, Method B: 2.9 ng/m<sup>2</sup>sPa (0.05 perms) max.
  2. Water Absorption: ASTM D570: max. 0.1% by weight
  3. Puncture Resistance: ASTM E154: 356 N (80 lbs.) min.
  4. Tear Resistance:
    - a. Initiation ASTM D1004: min. 58 N (13.0 lbs.) M.D.
    - b. Propagation ASTM D1938: min. 40 N (9.0 lbs.) M.D.
  5. Lap Adhesion at -4°C (25°F): ASTM D1876: 880 N/m (5.0 lbs./in.) of width
  6. Low Temperature Flexibility: ASTM D1970: Unaffected to -43°C (-45°F)
  7. Tensile Strength: ASTM D412, Die C Modified: min. 5.5 MPa (800 psi)
  8. Elongation, Ultimate Failure of Rubberized Asphalt: ASTM D412, Die C: min. 200%.
  9. Product: Perm-A-Barrier Wall Flashing manufactured by Grace Construction Products.
- G. Substrate Patching Membrane: Manufacturer's standard trowel-grade substrate filler.
1. Product: Bituthene Liquid Membrane, manufactured by Grace Construction Products.
- H. Sprayed Polyurethane Foam Sealant: 1- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft (24 to 32 kg/cu. m) density; flame spread index of 25 or less according to ASTM E162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.
- I. Joint Sealant: ASTM C920, single-component, neutral-curing silicone; Class 100/50 (low-modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
  2. Verify that concrete has cured and aged for minimum time period recommended by air barrier manufacturer.
  3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.
  4. Verify that masonry joints are struck flush and completely filled with mortar.
  5. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.02 SURFACE PREPARATION

- A. Refer to manufacturer's literature for requirements for preparation of substrates. Surfaces to be sound and free of voids, spalled areas, loose aggregate, and sharp protrusions. Remove contaminants such as grease, oil, and wax from exposed surfaces. Remove dust, dirt, loose stone, and debris. Use repair materials and methods that are acceptable to manufacturer of the fluid-applied air barrier system.

- B. Exterior sheathing panels: Ensure that the boards are sufficiently stabilized with corners and edges fastened with appropriate screws. Pre-treat all board joints with 50 - 75mm (2-3 in.) wide, manufacturer's recommended self-adhesive tape. Gaps greater than 6mm (1/4 in.) should be filled with mastic or caulk, allowing sufficient time to fully cure before application of the tape and fluid applied air barrier system.
- C. Masonry Substrates: Apply air and vapor barrier over concrete block and brick with smooth trowel-cut mortar joints, struck full and flush. Fill all voids and holes, particularly in the mortar joints, with a lean mortar mix, non-shrinking grout or parge coat.
- D. Related Materials: Treat construction joints and install flashing as recommended by manufacturer.
- E. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.
- F. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- G. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- H. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate patching membrane.
- I. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- J. At changes in substrate plane, apply sealant or Bituthene Liquid Membrane at sharp corners and edges to form a smooth transition from one plane to another.
- K. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

### 3.03 JOINT TREATMENT

- A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C1193 and air barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D4258 before coating surfaces.
  - 1. Prime substrate as required.
- B. Gypsum Sheathing: Fill joints greater than 1/4 inch (6 mm) with sealant according to ASTM C1193 and with air barrier manufacturer's written instructions. Apply tape to joint prior to installing fluid air barrier membrane.

### 3.04 AIR BARRIER MEMBRANE INSTALLATION

- A. Apply air barrier membrane to achieve a continuous air barrier according to air barrier manufacturer's written instructions.
- B. Apply air barrier membrane within manufacturer's recommended application temperature ranges.
- C. Apply a continuous unbroken air barrier to substrates according to the following minimum thickness. Apply membrane in full contact around protrusions such as masonry ties.
  - 1. Vapor-Permeable Membrane Air Barrier: 90-mil (2.4-mm) wet film thickness, 45-mil (1.2-mm) dry film thickness.
- D. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.

- E. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.

### 3.05 TRANSITION STRIP INSTALLATION

- A. Install strips, transition strips, and auxiliary materials according to air barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.
  - 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
  - 2. Install strip on roofing membrane or base flashing so that a minimum of 3 inches (75 mm) of coverage is achieved over both substrates.
  - 3. Install all flashings only after application of air barrier.
- B. Apply primer to substrates to receive transition tapes at required rate and allow to dry. Limit priming to areas that will be covered by transition tape in same day. Reprime areas exposed for more than 24 hours.
  - 1. Prime glass-fiber-surfaced gypsum sheathing not covered with air membrane material with number of prime coats needed to achieve required bond, with adequate drying time between coats.
- C. Connect and seal exterior wall air barrier membrane continuously to roofing membrane air barrier, concrete below-grade structures, floor-to floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- E. Apply joint sealants forming part of air barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Wall Openings: Prime concealed perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip so that a minimum of 3 inches (75 mm) of coverage is achieved over both substrates. Maintain 3 inches (75 mm) of full contact over firm bearing to perimeter frames with not less than 1 inch (25 mm) of full contact.
  - 1. Transition Strip: Roll firmly to enhance adhesion.
- G. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air barrier membrane with foam sealant.
- H. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches (150 mm) beyond repaired areas in strip direction.

### 3.06 FIELD QUALITY CONTROL

- A. Testing Agency: Owner may engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Inspections: Air barrier materials and installation are subject to inspection for compliance with requirements. Inspections may include the following:
  - 1. Continuity of air barrier system has been achieved throughout the building envelope with no gaps or holes.
  - 2. Continuous structural support of air barrier system has been provided.
  - 3. Masonry and concrete surfaces are smooth, clean and free of cavities, protrusions, and mortar droppings.
  - 4. Site conditions for application temperature and dryness of substrates have been maintained.
  - 5. Maximum exposure time of materials to UV deterioration has not been exceeded.

6. Surfaces have been primed, if applicable.
  7. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
  8. Termination mastic has been applied on cut edges.
  9. Strips and transition strips have been firmly adhered to substrate.
  10. Compatible materials have been used.
  11. Transitions at changes in direction and structural support at gaps have been provided.
  12. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
  13. All penetrations have been sealed.
- C. Tests: Testing to be performed will be determined by Owner's testing agency from among the following tests:
1. Qualitative Testing: Air barrier assemblies will be tested for evidence of air leakage according to ASTM E1186, smoke pencil with pressurization or depressurization.
- D. Remove and replace deficient air barrier components and retest as specified above.

### 3.07 CLEANING AND PROTECTION

- A. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
- B. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. Remove and replace air barrier exposed for more than 150 days.
- C. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.
- D. Remove masking materials after installation.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

- A. Furnish all labor, materials and equipment, and perform all work to install insulated metal wall panels as shown on the drawings and as specified herein. Also included, are all necessary trims, fasteners, sealants, and gaskets as required for a weathertight installation. Panels shall be secured to the structure with concealed clips and fasteners in the sidejoints.
1. Steel faced factory foamed in-place profiled panels with compatible joinery. Panels shall be designed to permit installation in either vertical or horizontal orientations.
  2. Extruded aluminum trim related to the walls and its intersection with adjacent materials.
  3. Sealants and gaskets between panels and their intersection.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.
1. Section 07 62 00 – Sheet Metal Flashing and Trim.
  2. Section 07 92 00 - Joint Sealants.

1.03 REFERENCES

- A. AAMA 501.1 – Standard Test Method for Exterior Windows, Curtain Walls and Doors for Water Penetration Using Dynamic Pressure.
- B. ASTM A 653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- C. ASTM C 518 – Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- D. ASTM E 72 – Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
- E. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
- F. ASTM E 119 – Standard Test Methods for Fire Tests of Building Construction and Materials.
- G. ASTM E 283 – Standard Method for Determining the Rate of Air Leakage Through Exterior Window, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- H. ASTM E 331 – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Wall by Uniform Static Air Pressure Difference.
- I. CAN 4-S101 – Standard Methods of Fire Endurance Tests of Building Construction and Materials.
- J. CAN/ULC S102 – Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- K. CAN/ULC S127 – Standard Corner Wall Method of Test for Flammability Characteristics of Non-Melting Building Materials.

1.04 PERFORMANCE REQUIREMENTS

- A. Structural Tests: The design load/deflection criteria shall be verified from tests per ASTM E 72 "Air Bag Method" using a 20 psf (.96 kPa) simulated wind load. A deflection limit of L/180 shall apply to wall panel.
- B. Thermal Transmission: Testing in accordance with ASTM C 518, "measurement of steady state thermal transmission", the panels shall provide a K-factor of .127 btu/sf/hr/deg. F at 75 deg. F. (24 deg. C) mean temperature.
- C. Vapor Barrier
  - 1. Air Infiltration: Air infiltration shall not exceed .06 cfm per square foot of wall area when tested per ASTM E 283 as a static pressure of 12.0 psf (.576 kPa).
  - 2. Static Water Penetration: There shall be no uncontrolled water penetration through the panel joints at a static pressure of 20.0 psf (.96 kPa) when tested per ASTM E 331.
  - 3. Dynamic Water Penetration: There shall be no uncontrolled water penetration through the panel joints when subjected to a 95 mph (153 kph) slipstream airflow and application of water for a 15 minute period in accordance with AAMA 501.1.
- D. Fire
  - 1. Factory Mutual Research Corporation (FMRC) Standard 4880, 50' (15.24 m) High Corner Test for Unlimited Height Structures: The panel assembly shall not support a self-propagating fire which reaches any of the limits of the 50 foot (15.24 m) high corner test structure as evidenced by flaming or material damage of the ceiling of the assembly. Note: Approval is applicable to structures of unlimited height.
  - 2. Surface Burning Characteristics: The insulated core shall have been tested in accordance with ASTM E 84 for surface burning characteristics. The core shall have a maximum flame spread of 25 and a maximum smoke developed rating of 450.
- E. Bond Strength
  - 1. Fatigue Test: The panel shall withstand deflection cycling at L/180 to two (2) million alternate cycles with no evidence of delamination, core cracking or permanent bowing.
  - 2. Freeze/Heat Cycling: The panel shall exhibit no delamination, surface blistering or permanent bowing when subjected to cyclic temperature extremes of -20° F (-28° C) to +180° F (+82° C) for twenty-one (21) eight hour cycles.
  - 3. Humidity Test: The panel shall exhibit no delamination or metal corrosion at interface when subjected to a +140° F (+60° C) temperature and 100% relative humidity for a total of 1200 hours.
  - 4. Autoclave Test: The panel shall exhibit no delamination of the foam core from metal skins when exposed to 2 psi (.122 kg/sq. cm) pressure at a temperature of +212° F (+100° C) for a total of 2 ½ hours.

1.05 SUBMITTALS

- A. Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Material type, metal thickness and finish.
  - 4. Installation methods.
- B. Shop Drawings: Including elevations, fastening patterns, sections of each condition and details as required.
- C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- D. Panel Sample: Submit 1' (305 mm) high by full width sample panel for each profile specified indicating the metal, texture and finish.

- E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing factory foamed in place insulated metal panels with a minimum documented experience of ten years.
- B. Installer Qualifications: Company specializing in installation of the products specified for projects of similar size and scope with minimum five years documented experience.

1.07 PROJECT CONDITIONS

- A. Provide a suitable area for storage of materials and equipment. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products off the ground, with panels sloped for drainage and covered to protect factory finishes from damage.

1.08 GUARANTEE

- A. Manufacturer's Warranty: Manufacturer's two (2) year limited warranty that panels are free from defects in materials and workmanship, beginning from the date of shipment of panels, but excluding coil coatings (paint finishes) covered under a separate warranty.
- B. Submit manufacturer's written five (5) year limited warranty providing panels to be free from gas blister formation of the foam core to the exterior panel facing, beginning from the date of shipment of panels.
- C. The installation contractor shall issue a separate one (1) year warranty against defects in installed materials and workmanship, beginning from the date of substantial completion of the installation.
- D. Submit exterior paint manufacturer's twenty (20) year limited warranty on paint finish against cracking, peeling, blistering, chalk and color change.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Basis of Design:
1. Metl-Span; [www.metlspan.com](http://www.metlspan.com)
  2. Substitutions: See Section 01 25 00 – Substitution Procedures.

2.02 PANELS

- A. Panel – General Requirements: Roll-formed exterior and interior steel sheet faces chemically bonded to continuously foamed-in-place polyurethane core; laminated panels are not acceptable:
1. Exterior and Interior Faces: ASTM A 653, minimum Grade 33, stucco embossed, G-90 galvanized and/or aluminum-zinc coated steel, unless otherwise indicated.
  2. Longitudinal Joint Sealants: Field applied.
  3. Foam Core: Non-CFC, Class I, polyurethane.
  4. Exterior Finish: One coat 70 % polyvinylidene fluoride nominal 0.7 mil (17.5 microns) thick over 0.2 mil (5 microns) base primer in manufacturer's standard colors; or one coat Siliconized Polyester 0.7 mil (17.5 microns) nominal thickness over 0.2 mil (5 microns) base primer in manufacturer's standard colors.
  5. Interior Finish: One coat Siliconized Polyester 0.7 mil (17.5 microns) nominal thickness over 0.2 mil (5 microns) primer in manufacturer's standard colors.

- B. Concealed fastener wall panels with offset double tongue and groove joinery and an extended metal shelf allowing fasteners to penetrate both metal faces with clips concealed in the sidejoint.
  - 1. Exterior Profile: Architectural Flat, 1/32" deep
  - 2. Interior Profile: Light Mesa, 1/8" deep
  - 3. Module Width: 42"
  - 4. Exterior Face: Stucco embossed G-90 galvanized and/or aluminum-zinc coated steel: 22 ga.
  - 5. Interior Face: Stucco embossed G-90 galvanized and/or aluminum-zinc coated steel: 22ga.
  - 6. Thickness: 2.5"
  - 7. Trimless ends provided at panel ends if required.
- C. Foam core shall be continuously foamed-in-place, Blister-Free, Non-CFC polyurethane, with the following nominal properties:
  - 1. 92% closed cell structure.
  - 2. Density: minimum 2.0 lbs./cu.ft. (32.1 kg/cu.m.).
  - 3. Compressive Strength: 22 psi (152 kPa).
  - 4. Tensile Strength: 33 psi (228 kPa).
  - 5. Shear Strength: 21 psi (145 kPa).
- D. Flashing and trim shall be brake-formed sheet metal in the same thickness and finish to match the panels.
  - 1. Use insulated metal wall panel manufacturer's extruded trim and flashing pieces for a weathertight fit.
  - 2. Install per flashing and trim details as provided by metal wall panel manufacturer.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Panel installer shall examine all structural steel before beginning installation to ensure that all supporting members are straight, level, plumb and satisfactory for panel installation.
- B. Do not begin installation until unsatisfactory conditions are corrected.
- C. Start of installation shall signify structure and adjacent conditions as being proper and acceptable.

#### 3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions and recommendations including approved shop drawings, installation guidebook and manufacturer's handbook of construction details.
- B. Form panel shape as indicated on drawings, accurate in size, square, and free from distortion or defects.
- C. Install flashing and trim true and in proper alignment.
- D. Install sealants where indicated to clean dry surfaces only without skips or voids, to ensure weathertightness and integrity of the vapor barrier.

#### 3.03 DAMAGED MATERIAL

- A. Damage caused by the manufacturer or wall panel contractor shall be replaced or repaired to as new construction.
- B. The panel installer shall inspect and approve each completed wall area and shall be responsible for protection of completed work from damage by other trades.

3.04 CLEANING

- A. Replace damaged panels and other components of work, which cannot be repaired by finish touch-up or similar minor repair.
- B. Wipe finished surfaces clean of any filings caused by drilling or cutting to prevent rust staining.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured metal panels for soffit panels, with insulation, related flashings, and accessory components.

1.02 RELATED SECTIONS

- A. Section 05 40 00 - Cold-Formed Metal Framing: Soffit panel substrate.
- B. Section 07 21 00 - Thermal Insulation.
- C. Section 07 92 00 - Joint Sealants: Sealing joints between metal soffit panel system and adjacent construction.

1.03 REFERENCES

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.
- B. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.
- D. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data - Soffit System: Manufacturer's data sheets on each product to be used, including:
  - 1. Physical characteristics of components shown on shop drawings.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation instructions and recommendations.
- C. Shop Drawings: Indicate dimensions, layout, joints, construction details, support clips, and methods of anchorage.
- D. Samples: Submit one sample of soffit panel, 12 inches by 12 inches in size illustrating finish color, sheen, and texture.
- E. Manufacturer's Qualification Statement.
- F. Installer's Qualification Statement.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.
- B. Installer Qualifications: Company specializing in installing products of the type specified in this section with minimum five years of documented experience.
- C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

1.06 MOCK-UP

- A. Construct mock-up, 10 feet long; include attachments to building frame, associated vapor retarder and air seal materials, sealants and seals, related insulation in mock-up.
- B. Locate where directed by Architect.
- C. Architect-approved mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect soffit panels from accelerated weathering by removing or venting sheet plastic shipping wrap.
- B. Store prefinished material off the ground and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage.
- C. Prevent contact with materials that may cause discoloration or staining of products.

1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Installation Warranty for Building Rainscreen Assembly: Installer of exterior rainscreen assembly (including air/vapor barrier and attachments, framing, and exterior panels) to provide 10-year warranty that includes coverage for defective materials and/or workmanship. This warranty will also clearly include materials, labor, necessary activity to access these areas, and removal of any materials to effect repairs and restore to watertight conditions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers - Metal Soffit Panels:
  - 1. ATAS International, Inc; Wind-Lok Soffit MPS 120: [www.atas.com](http://www.atas.com).
  - 2. Berridge Manufacturing Company; M-Panel: [www.berridge.com](http://www.berridge.com).
  - 3. Englert, Inc; B4000: [www.englertinc.com](http://www.englertinc.com).
  - 4. Fabral; Posi-Lock Soffit: [www.fabral.com](http://www.fabral.com).
  - 5. McElroy Metal: [www.mcelroymetal.com](http://www.mcelroymetal.com).
  - 6. Metal Roofing Systems, Inc; Flush Seam Soffit Panels: [www.metalroofingsystems.biz](http://www.metalroofingsystems.biz).
  - 7. Petersen Aluminum Corporation; PAC-750 Soffit: [www.pac-clad.com](http://www.pac-clad.com).
  - 8. Sheffield Metals International; SMI 1.0 inch FWP Flush Wall and Soffit Panel: [www.sheffieldmetals.com](http://www.sheffieldmetals.com).
  - 9. Substitutions: 01 25 00 - Substitution Procedures.

2.02 MANUFACTURED METAL PANELS

- A. Soffit Panels:
  - 1. Profile: Style as indicated, with venting provided.
  - 2. Material: Precoated aluminum sheet, 20 gauge, 0.032 inch minimum thickness.
  - 3. Color: As selected by MBI Companies.
- B. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles.
- C. Expansion Joints: Same material, thickness and finish as exterior sheets; manufacturer's standard brake formed type, of profile to suit system.
- D. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles.
- E. Anchors: Galvanized steel.

2.03 MATERIALS

- A. Precoated Aluminum Sheet: ASTM B209 (ASTM B209M), 3105 alloy, O temper, smooth surface texture; continuous-coil-coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.
- B. Select materials with surface flatness, smoothness, and lack of surface blemishes where exposed to view in finished system.

2.04 FINISHES

- A. Exposed Surface Finish: Panel manufacturer's standard polyvinylidene fluoride (PVDF) coating, top coat over epoxy primer.
- B. Panel Backside Finish: Panel manufacturer's standard siliconized polyester wash coat.

- C. Fluoropolymer Coil Coating System: Manufacturer's standard multi-coat aluminum coil coating system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin, and at least 80 percent of coil coated aluminum surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch; color and gloss as selected from manufacturer's standards.

## 2.05 ACCESSORIES

- A. Cladding Support Clips: Thermally-broken, galvanized steel clips for support of cladding z-girts, angles, channels and other framing.
  - 1. Galvanized Steel Sheet: ASTM A653/A653M, with G90/Z275 galvanized coating.
  - 2. Manufacturers:
    - a. Northern Facades; ISO Clip: [www.northernfacades.com](http://www.northernfacades.com).
    - b. Substitutions: 01 25 00 - Substitution Procedures.
- B. Gaskets: Manufacturer's standard type suitable for use with system, permanently resilient; ultraviolet and ozone resistant.
- C. Concealed Sealants: Non-curing butyl sealant or tape sealant.
- D. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
  - 1. Manufacturers:
    - a. Franklin International, Inc; Titebond WeatherMaster Metal Roof Sealant: [www.titebond.com](http://www.titebond.com).
    - b. Substitutions: 01 25 00 - Substitution Procedures.
- E. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, steel, hot dip galvanized. Exposed fasteners same finish as panel system.
  - 1. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws.
  - 2. Manufacturers:
    - a. ITW Commercial Construction North America; Teks Select Series: [www.ITWBuildex.com](http://www.ITWBuildex.com).
    - b. Substitutions: 01 25 00 - Substitution Procedures.
- F. Field Touch-up Paint: As recommended by panel manufacturer.
- G. Bituminous Paint: Asphalt base.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that framing members are ready to receive panels.
- B. Verify that water-resistive barrier has been installed over substrate completely and correctly.

### 3.02 PREPARATION

- A. Install subgirts perpendicular to panel length, securely fastened to substrates and shimmed and leveled to uniform plane. Space at intervals indicated.

### 3.03 INSTALLATION

- A. Install panels on soffits in accordance with manufacturer's instructions.
- B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.
- C. Fasten panels to structural supports; aligned, level, and plumb.
- D. Locate joints over supports.
- E. Lap panel ends minimum 2 inches.
- F. Provide expansion and control joints where indicated.
- G. Use concealed fasteners unless otherwise approved by MBI Companies.

- H. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

3.04 TOLERANCES

- A. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.
- B. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch.

3.05 CLEANING

- A. Remove site cuttings from finish surfaces.
- B. Remove protective material from wall panel surfaces.
- C. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- D. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.
- E. Upon completion of installation, thoroughly clean prefinished aluminum surfaces in accordance with AAMA 609 & 610.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A Fully adhered, self-adhered, rubber membrane roofing system.
- B Rigid insulation.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions, and Division 1, General Requirements, apply to the work under this section.
  - 1. Section 07 62 00 – Sheet Metal Flashing and Trim.
  - 2. Section 07 92 00 – Joint Sealants.

1.03 PERFORMANCE REQUIREMENTS

- A General: Install sheet membrane roofing and base flashing that are watertight; will not permit the passage of liquid water; and will withstand wind loads, thermally induced movement; and exposure to weather without failure.
- B Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing system manufacturer based on testing and field experience.
- C Fire Rating: Roof Assembly must conform to UL Class A requirements and roof membrane and accessories must be fire rated and bear the FR marking.

1.04 SUBMITTALS

- A Shop Drawings: Submit indicating roof size, membrane seaming diagram, location and type of penetrations, perimeter and penetration details, base flashings and membrane termination, roof insulation make-up and layout that have been accepted by an authorized manufacturer's representative.
- B Warranty: Submit two copies of manufacturer's 20 year warranty for EPDM elastomeric sheet roofing.
- C Submit manufacturer's installation specifications or instructions.
- D Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install specified roofing system.
- E Manufacturer Certificates: Signed by roofing manufacturer certifying that the roofing system complies with requirements specified. Upon request, submit evidence of meeting requirements.
- F Warranty: Sample copy of standard roofing system manufacturer's warranty stating obligations, remedies, limitations, and exclusions of warranty.

1.05 REFERENCES

- A American society for Testing and Materials (ASTM).
- B Federal Specifications FSHH-I-1972/1 Class 2.

1.06 SYSTEM DESCRIPTION

- A All Roofing, unless otherwise noted, shall be elastomeric sheet roofing fully self-adhered over rigid insulation.

1.07 QUALITY ASSURANCE

- A Roofing applicator shall be certified in writing by Manufacturer as a licensed applicator.
- B A single installer shall perform the work of this Section and shall have completed projects of similar scope and complexity.
- C All membrane roofing shall be provided by the same manufacturer and installed by the same Contractor for single source warranty coverage.

1.08 PREINSTALLATION CONFERENCE

- A Before installing roofing system, conduct conference at Project site to review installation requirements and conditions. Provide a minimum of 72 hours notice to all parties required to be present at meeting.
  - 1. Meet with Owner's representative, Architect, Roofing installer, Roofing system manufacturer's representative, deck installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof mounted equipment.
  - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
  - 3. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
  - 4. Review loading limitations of deck during and after roofing.
  - 5. Review flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing.
  - 6. Review governing regulations and requirements for insurance, certificates, and inspection and testing if applicable.
  - 7. Review temporary protection requirements for roofing system during and after installation.
  - 8. Review roof observation and repair procedures after roofing installation.
  - 9. Document proceeding, including corrective measures or actions required, and furnish copy of record to each participant.

1.09 ENVIRONMENTAL REQUIREMENTS

- A Weather Conditions: Proceed with elastomeric sheet roofing work only when weather conditions comply with manufacturer's recommendations and will permit materials to be applied and cured in accordance with those recommendations. Do not exceed temperature limitations recommended by roofing manufacturer.

1.10 WARRANTY

- A Manufacturer's Warranty: Submit executed copy of roofing manufacturer's 20 year warranty executed on the signed by an authorized representative of elastomeric sheet roofing system manufacturer,

PART 2 PRODUCTS

2.01 MATERIALS

- A General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
- B Base layer: Polyisocyanurate Board Insulation: ASTM C 1289, Type II, glass-fiber mat facer on both major surfaces.
  - 1. Insulation available from the following manufacturers may be used if approved by the manufacturer of the roofing membrane proposed:
    - a. Atlas Roofing Corporation.
    - b. Carlisle SynTec Incorporated.
    - c. Celotex Corporation.
    - d. Elevate (formerly Firestone).
    - e. GAF Materials Corporation.

- f. Hunter Panels, LLC.
      - g. Johns Manville International, Inc.
    - 2. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope indicated on drawings.
    - 3. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.
    - 4. Minimum Total insulation R-Value: As indicated on drawings. If not indicated on drawings, provide minimum R-30.
  - C Insulation Overlay Board- ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/4 inch thick factory primed. Basis of design is DensDeck Prime as manufactured by Georgia-Pacific Corporation. Equal product of other manufacturer is acceptable.
  - D Elastomeric Sheet Roofing System Components
    - 1. Basis of Design Manufacturer: Elevate; Nashville, TN; [www.holcimelevate.com](http://www.holcimelevate.com).
    - 2. Membrane Material: RubberGard SA Ethylene Propylene Diene Monomer (EPDM), 60 mil Self-Adhering Membrane.
    - 3. High density wood fiber crickets shall be 1/2" thick min. by Georgia Pacific or Celotex.
    - 4. Walkway Pads: 30 inch by 30 inch .30 inch thick.
  - E Miscellaneous
    - 1. Nailers, Blocking: No. 2 or better, S4S, Douglas Fir-Larch, preservative-treated for rot resistance.
- 2.02 ACCESSORIES
- A. Roofing Expansion Joint Flashing: Sheet metal, as specified in Section 07 62 00.
  - B. Stack Boots: Prefabricated flexible boot and collar for pipe stacks through membrane; elastomeric material compatible with membrane.
  - C. Cant Strips: Wood, pressure preservative treated. See Section 06 10 00.
  - D. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.
  - E. Membrane Adhesive: As recommended by membrane manufacturer.
  - F. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.
  - G. Thinners and Cleaners: As recommended by adhesive manufacturer, compatible with membrane.
  - H. Insulation Adhesive: As recommended by insulation manufacturer.
  - I. Strip Reglet Devices: Galvanized steel, maximum possible lengths per location, with attachment flanges.
  - J. Sealants: As recommended by membrane manufacturer.
  - K. Walkway Pads: Suitable for maintenance traffic, contrasting color or otherwise visually distinctive from roof membrane.
    - 1. Composition: Roofing membrane manufacturer's standard.
    - 2. Size: Manufacturers standard size.

### PART 3 EXECUTION

#### 3.01 DELIVERY, STORAGE AND HANDLING

- A Deliver roofing materials, insulation and accessories in manufacturer's protective containers with labels intact and legible, and comply with manufacturer's instructions for storage and handling.
- B Handle rolled goods to prevent damage.
- C Store all materials on clean, raised platforms with weather-protective covering.

### 3.02 INSTALLATION

- A Verify proper placement of all roof openings, pipes, curbs, sleeves, ducts, vents and drains.
- B Substrate preparation
1. Comply with manufacturer's instructions for preparation of substrate to receive elastomeric sheet roofing. Clean substrate of dust, debris, and other substances detrimental to elastic sheet roofing work.
  2. Beginning of installation means acceptance of conditions as satisfactory.
- C Nailers, Blocking
1. Install blocking at the base of roof projections, penetrations and non-roof edge perimeters as detailed.
  2. Install treated wood nailers at roof perimeters, at base of roof projections and around specified roof penetration.
    - a. Total nailer height shall match total thickness of insulation being used. Install with 1/8" gap between each length and at changes in direction.
    - b. Firmly fasten nailer to the deck, wall or existing structurally sound and secured nailers at 16" o.c. maximum, batten strips at 12" o.c. maximum, so as to resist a force of 200 lbs. per lineal foot in any direction.
    - c. Taper nailer where applicable to be flush at point of contact with membrane in either the vertical or horizontal applications.
- D Roof Insulation
1. Loosely lay roof insulation with end joints staggered Joints shall be 1/4" or less in width. Neatly cut and fit insulation around roof penetrations and projections. Install only dry insulation and only as much insulation as can be covered the same day with membrane and completed.
  2. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
  3. Anchor roof insulation in accordance with system manufacturer's requirements for fastener type, placement and density.
  4. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Loosely butt cover boards together and fasten to roof deck according to roofing system manufacturer's written instructions.
- E Installation Instructions - Fully Self-Adhered Roofing
1. Install elastomeric sheet roofing in accordance with manufacturer's current printed instructions.
  2. Loosely lay sheet membrane over roof insulation and allow the membrane to relax 30 minutes minimum before bonding, splicing or attaching.
  3. Secure membrane at all locations where the membrane terminates or goes through an angle change greater than 2 inches in 12 inches (i.e. Roof edges, curbs, interior walls, etc.), except for round pipe penetrations less than 18 inches in diameter and square penetrations less than 4 inches square.
  4. Install walkway pads in locations indicated. Adhere walkway pads to substrate with seam tape according to the manufacturer's written instructions.

### 3.03 CLEANING

- A Remove trash and debris resulting from roofing work at end of each day's work.

### 3.04 MANUFACTURER'S FIELD SERVICE

- A Upon completion of the roofing system, authorized roofing manufacturer's representative will make an inspection of the installation for final acceptance. Manufacturer's representative will issue a written report of inspection findings to the Architect with a copy to the Roofing Consultant.

- B The Contractor shall provide a minimum of 72 hours advance notice to the Architect and the Roofing Consultant before the Manufacturer's representative's visit.

3.05 PROTECTION AND REPAIR

- A Protect sheet membrane roofing from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to the Architect and Roof Consultant.
- B Correct deficiencies in or remove roofing that does not comply with requirements, repair substrates, reinstall roofing, and repair sheet flashings to a condition free of damage and deterioration at the time of Substantial Completion and according to warranty requirements.

END OF SECTION



PART 1 GENERAL

1.01 SCOPE

- A. Standing seam sheet metal roofing.
- B. Snow guards.

1.02 RELATED DOCUMENTS

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.
  - 1. Section 07 60 00 – Sheet Metal Flashing and Trim.

1.03 SUBMITTALS

- A. Submit manufacturer's data, installation instructions, and 6" square samples of specified materials to the Architect for approval.
- B. Submit complete shop drawings showing expansion joint details and waterproof connections to adjoining work and at obstructions and penetrations.
- C. Submit results indicating compliance with minimum requirements of the specified performance tests and results.
- D. Submit calculations with registered engineer seal, verifying roof panel and attachment method resists wind pressures imposed on it pursuant to applicable building codes.

1.04 WARRANTY

- A. Provide manufacturer's standard twenty (20) year limited warranty on prefinished metal coatings.
- B. Roofing shall be guaranteed to be weather-tight for a minimum of two (2) years. Any leakage during the two year warranty period shall be repaired and paid for the Contractor.

PART 2 PRODUCTS

2.01 STANDING SEAM ROOFING

- A. Approved Systems and Manufacturers:
  - 1. Basis of Design: Snap-Clad Panel by Peterson Aluminum, PAC-CLAD.
  - 2. "Tee-Panel" as manufactured by Berridge
  - 3. "UC-14 Snap On" system as manufactured by Firestone Metal Products, Una-Clad.
  - 4. "Snap On Seam High Profile" as manufactured by Fabral.
  - 5. Additional systems and manufacturers must be approved by Architect prior to bidding.
- B. Panel: Nominal 12" wide G-90, Grade C, ASTM A653 & ASTM A924, hot dipped galvanized steel panel, ASTM-A446-85, with minimum 1 inch high standing seam.
  - 1. Material Thickness: 24 gauge.
  - 2. Color: Kynar 500 (0.80 to 0.90 mil dry film thickness) "Color as selected by the Architect to match Metal Building Fascia Panels". Total dry film coating thickness with primer to be 1.0 to 1.25 mils. Provide strippable protective film. Provide reverse side backer coating with 0.25 mil dry film thickness.
  - 3. Length: Manufacturers standard 40 ft. or less in one continuous length.
- C. Fabrication: Fabricate panels, trim and accessories to allow controlled expansion in running lengths in relation to system components, adjoining materials, flashing and wall construction.

- D. Performance:
  - 1. Air Infiltration ASTM E283
  - 2. Water Infiltration ASTM E331

## 2.02 TRIM AND ACCESSORIES

- A. General:
  - 1. Metal flashings and trim shall be from the same manufacturer and of the same material and gauge as panels. Exposed components shall be formed in longest possible lengths. Color to match panels.
  - 2. Manufacturer's standard fasteners, brackets, clips, furring strips, spacers, flashings, closures, weather -stripping, joint sealers, sealants, expansion control, etc. as required for complete weather-tight installation.
  - 3. Anchorage: Provided by the manufacturer. Comply with manufacturer's instructions.

## 2.03 SNOW GUARDS

- A. Basis of Design: ColorGard Snow Retention System by Peterson Aluminum, PAC-CLAD.
  - 1. Provide clamps by S-5! for attachment to ribs of standing seam roofing.
- B. Single source: Provide snow guards from same manufacturer as Architect-approved standing seam metal roofing.

## 2.04 MISCELLANEOUS MATERIALS

- A. Bituminous Coating: Cold applied asphaltic, complying with FS TT-C-494, Type II, 12 mils min. dry film thickness.
- B. Underlayment: 30 lb. Unperforated, organic asphalt saturated roofing felt, complying with ASTM D226, 36 inches wide.
- C. Paper Slip Sheet: 5-lb. Rosin sized building paper.

## 2.05 SHOP FABRICATED UNITS

- A. Expansion Provisions: Where lapped or bayonet-type provisions cannot be used, form expansion joints of intermeshing hooked flanges not less than 1 inch deep, filled with mastic sealant.
- B. Sealant Joints: Where movable, non-expansion joints are indicated, for m metal to provide for proper installation of electrometric sealant in compliance with SMACNA standards.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. System shall be installed straight and true to line, in compliance with manufacturer's instructions.
- B. Panel system shall not come in contact with dissimilar materials which will cause harmful reactions between the metals and/or finish.
- C. Separate dissimilar metals with coat of bituminous paint, concealed on one or both sides.
- D. Install underlayment and slip sheet on solid substrate.
- E. Panels shall be fully interlocked with its adjacent panel.
- F. Fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, flashings, etc. to allow drainage. Seal joints as required. Provide leak-proof construction.

- G. Sealant Joints: Embed hooked flanges not less than 1 inch into sealant. Completely conceal sealant.
- H. Install system to prevent bending buckling, twisting, abrasion, scratching, denting, etc. Only minor scratches may be touched-up in field.
- I. Anchor components securely in place. Use fasteners recommended by panel manufacturer. Accommodate thermal and structural movement. Use gasketed fasteners to prevent electrolytic action between metals. Conceal all fasteners and anchors.

3.02 CLEANING

- A. Remove protective film upon completion without damaging finish.
- B. Completed system shall be clean and free from grease, stains and finger marks.

3.03 PROTECTION

- A. Protect work to be free from damage at time of Owner's acceptance and completion of entire project.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counterflashings, gutters, downspouts, sheet metal roofing, and gravel stop.
- B. Sealants for joints within sheet metal fabrications.
- C. Precast concrete splash blocks.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 – Cast-in-Place Concrete: Placement of recessed reglets in formwork.
- B. Section 04 20 00 - Unit Masonry: Metal flashings embedded in masonry.
- C. Section 06 10 00 - Rough Carpentry: Wood nailers for sheet metal work, and field fabricated roof curbs.
- D. Section 07 61 13 – Standing Seam Sheet Metal Roofing.
- E. Section 07 72 00 - Roof Accessories: Manufactured metal roof curbs.
- F. Section 07 92 00 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

1.03 REFERENCE STANDARDS

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
- B. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).
- C. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).
- D. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- F. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- G. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- H. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric).
- I. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
- J. ASTM D2178/D2178M - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
- K. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free.
- L. SMACNA (ASMM) - Architectural Sheet Metal Manual.

1.04 ADMINISTRATIVE REQUIREMENTS

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

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- C. Samples: Submit two samples 6 by 6 inches in size illustrating metal finish color.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) requirements and standard details, except as otherwise indicated.
- B. Maintain one copy of each document on site.
- C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 5 years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sheet Metal Flashing and Trim Manufacturers:
  - 1. Fairview Architectural LLC: [www.fairview-na.com](http://www.fairview-na.com).
  - 2. OMG Roofing Products: [www.omgroofing.com](http://www.omgroofing.com).
  - 3. Petersen Aluminum Corporation: [www.pac-clad.com](http://www.pac-clad.com).
  - 4. Substitutions: 01 25 00 - Substitution Procedures.

2.02 SHEET MATERIALS

- A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gauge, (0.0239 inch) thick base metal.
- B. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gauge, (0.0239) inch thick base metal, shop pre-coated with PVDF coating.
  - 1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
  - 2. Color: As indicated on drawings.
- C. Aluminum: ASTM B209 (ASTM B209M); 20 gauge, (0.032 inch) thick; anodized finish of color as selected.
  - 1. Clear Anodized Finish: AAMA 611 AA-M12C22A41 Class I clear anodic coating not less than 0.7 mils thick.
- D. Pre-Finished Aluminum: ASTM B209 (ASTM B209M); 20 gauge, (0.032 inch) thick; plain finish shop pre-coated with modified silicone coating.
  - 1. Modified Silicone Polyester Coating: Pigmented Organic Coating System, AAMA 2603; baked enamel finish system.
  - 2. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system.
  - 3. Color: As selected by MBI Companies from manufacturer's standard colors.
- E. Stainless Steel: ASTM A666, Type 304 alloy, soft temper, 28 gauge, (0.0156 inch) thick; smooth No. 4 - Brushed finish.

2.03 METAL COPING

- A. A shop fabricated coping system formed from 24 gauge prefinished paintgrip galvanized steel (.050 Prefinished aluminum), (Kynar 500) constructed in accordance with Figure 3-4A SMACNA 5<sup>th</sup> Edition may be used in lieu of the above referenced manufactured systems. Provide 6" wide cover plates and gutter bars at joints. Submit detailed shop drawings of accessories and connections for review.

2.04 METAL GRAVEL STOP/ FASCIA AND GUTTER SYSTEM

- A. Fascia on buildings shall be Econosnap® 24 gauge prefinished steel, fascia, as manufactured by Hickman, or approved equal of or Construction Specialties. Fascia system shall include fascia cover, gutter/splice plate, anchor plate, seal strips, anchors, and all accessories. System shall include Drain-thru gravel Stop in conjunction with gutters. Gutter brackets shall be formed from 3/16 inch by 1 inch G-90 galvanized steel. Gutter support brackets and spacers shall be provided at 3 feet on center maximum.
- B. A shop fabricated Gutter and fascia/gravel stop system, fabricated from .032 inch prefinished aluminum gutter and gravel stop system conforming to Figure 1-13 A SMACNA 5<sup>th</sup> edition may be used in lieu of the above referenced manufactured systems. Gutter brackets shall be formed from 3/16 inch by 1 inch prefinished G-90 galvanized steel. Gutter support brackets and spacers shall be provided at 3 feet on center maximum.

2.05 GUTTERS AND DOWNSPOUTS

- A. Downspouts shall be a premanufactured system fabricated from .032 inch Aluminum in accordance Figure 1-31 SMACNA 5<sup>th</sup> edition. Provide downspout hangers of .028 inch Aluminum, fabricated in accordance with accordance Figure 1-35H SMACNA 5<sup>th</sup> edition. Locate downspout hangers 6 feet apart maximum, no more than 2 feet from the top and bottom of the downspout. Provide a minimum of 2 hangers per downspout.
1. Basis of Design: Rectangular corrugated aluminum fabricated from 0.032 inch thick material as manufactured by Spectra Metal Sales, Inc., 6104 Boat Rock Blvd. SW, Atlanta, GA
    - a. Provide premanufactured type "A" and "B" elbows as required by project conditions.
- B. Joints, end caps, and expansion joints in gutters and downspouts shall be made be the "Rivseal" procedure. Apply Gutterseal to the joint and then draw joint tight by blind riveting.
- C. Provide expansion joints in gutters at 40 feet on center maximum.
- D. Where downspouts are subject to damage from groundskeeping equipment or vehicular traffic, provide downspout boot fabricated from 10 gauge prefinished G-90 galvanized steel in accordance with SMACNA Figure 1-32I. Protection covers shall be set 1 foot above grade and shall extend to 3 feet above grade and shall be fastened to wall with 6 minimum ¼ inch diameter sleeve anchors.
- E. Provide and install 16 inch by 30 inch precast reinforced concrete splash blocks as at all downspouts that empty on grade.

2.06 THROUGH WALL METAL SCUPPER

- A. Scuppers shall be a shop fabricated to conform to Figure 1-26 SMACNA 5<sup>th</sup> edition.
- B. Downspouts shall be fabricated from 26 gauge steel in accordance with Plate 1-32 B SMACNA 5<sup>th</sup> Edition. Provide downspout hangers of 24 gauge G-90 galvanized steel fabricated in accordance with Figure 1-35 H SMACNA 5<sup>th</sup> edition. Locate downspout hangers 6 feet apart maximum, no more than 2 feet from the top and bottom of the downspout. Provide a minimum of 2 hangers per downspout.

2.07 WATERPROOF UNDERLAYMENT UNDER COPINGS

- A. Self-Adhering Sheet Underlayment, High Temperature: Minimum of 30- to 40-mil- (0.76- to 1.0-mm-) thick, slip-resisting, polyethylene-film-reinforced top surface laminated to layer of butyl or SBS-modified

asphalt adhesive, with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment.

1. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D 1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.
3. Acceptable Products:
  - a. Carlisle Coatings & Waterproofing; Dri-Start HR
  - b. Grace, W. R. & Co.; Vycor Ultra
  - c. Henry Company; Perma-Seal PE.
  - d. SafSeal Innovations; SafSeal 6640.
  - e. TC MiraDRI; WIP 300HT.

## 2.08 THROUGH WALL FLASHING

- A. Fabric thru-wall flashing shall be Copper Fabric Flashing with 3 oz. per square foot copper sheet asphalt-and pressure- laminated on both sides with a treated glass fabric. Provide Sandell's Copper Fabric Thru-Wall Flashing as manufactured by Hohmann & Barnard Inc. or Multi-Flash 500 as manufactured by York Manufacturing or Copper Fabric as manufactured by Advanced Building Products Inc.
  1. Flashing shall be embedded in the mortar joint of CMU backup walls or attached to metal stud walls with metal termination bar.
  2. Joints in Flashing shall be made by lapping a minimum of 4 inches and coating surfaces with Sandell Asphalt Trowel Mastic.
- B. Provide 1/8 in thick by 1 inch type 304 stainless steel termination bar at attachment of through wall flashing to metal stud walls. Attach termination bar to framing at 16 inches on center with self tapping screws.
  1. Acceptable products:
    - a. Type T1 as manufactured by Hohmann& Barnard Inc.
    - b. Termination bar as manufactured by Heckmann Building Products
    - c. Termination bar as manufactured by Sandell Manufacturing
    - d. Termination bar as manufactured by Wire Bond
    - e. Equal products of other manufacturers approved by Architect prior to bidding.
- C. Sealant for top of termination bar shall be a multicomponent non-sagging urethane sealant complying with ASTM C920 for type M, Grade NS, class 25, Uses A, G, M, and O as applicable to joint substrates. Provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements of ASTM C920 for uses indicated. Acceptable manufacturers include DAP, Pecora, Sonneborn, and Tremco.
  1. Additional Movement Capability: 50 percent movement in extension and 50 percent in compression for a total of 100 percent movement.

## 2.09 BASE AND COUNTER FLASHING

- A. Base and Counter Flashing associated with roof to wall intersections shall be fabricated in accordance with Figure 4-7A SMACNA 5th ed.
  1. Separate pieces of base flashing are installed as each course of shingles is applied. The upper edge of each piece of flashing should extend 2 inches above each course of shingles. The lower edge should be 1/2 inch above the butts of the singles forming the next course. Flashing must extend up the wall and onto the roof a minimum of 4 inches. Flashing pieces are nailed to the roof sheathing above the top of each shingle course
  2. Counter flashing is installed in a reglet left by the mason or cut by the Contractor. Wedges or tension formig shapes are used to hold the counter flashing in place and the reglet is filled with a compatable sealant. The length of each piece of counter flashing will vary with the slope of the roof but no step should be more than 8 inches high. The width will vary but should always be wide enough to cover 4 inches of the base flashing.

## 2.10 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- F. Fabricate flashings to allow toe to extend 2 inches over roofing gravel. Return and brake edges.
- G. Joints for gravel stop fascia system, coping cap shall be formed with a 3/8" opening between sections. The opening shall be backed by an internal drainage plate formed to the profile of fascia piece.

#### 2.11 GUTTER AND DOWNSPOUT FABRICATION

- A. Gutters: SMACNA (ASMM), Rectangular profile.
- B. Downspouts: Rectangular profile.
- C. Gutters and Downspouts: Size indicated on drawings.
- D. Accessories: Profiled to suit gutters and downspouts.
  - 1. Anchorage Devices: In accordance with SMACNA (ASMM) requirements.
- E. Splash Blocks: Precast concrete type, of size and profiles indicated; minimum 3,000 psi at 28 days, with minimum 5 percent air entrainment.
- F. Seal metal joints.

#### 2.11 ACCESSORIES

- A. Fasteners: Galvanized steel, with soft neoprene washers.
- B. Underlayment: ASTM D2178/D2178M, glass fiber roofing felt.
- C. Primer: Zinc chromate type.
- D. Concealed Sealants: Non-curing butyl sealant.
- E. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
- F. Plastic Cement: ASTM D4586/D4586M, Type I.
- G. Reglets: Surface mounted type, galvanized steel.

#### 2.12 FINISH

- A. Finish on conductor heads, downspouts, and accessories shall be Kynar 500. **Color shall be selected by the Architect from the manufacturer's standard colors.**
- B. Finish on coping shall be Kynar 500 in color to match fascia, gutters and downspouts.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.
- C. Field measure site conditions prior to fabricating work.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats, before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

- A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted.
- B. Apply plastic cement compound between metal flashings and felt flashings.
- C. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- D. Seal metal joints watertight.
- E. Secure gutters and downspouts in place with concealed fasteners.
- F. Slope gutters 1/4 inch per 10 feet, minimum.
- G. Connect downspouts to downspout boots, and seal connection watertight.
- H. Set splash blocks under downspouts that empty onto grade.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for field inspection requirements.
- B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION

## PART 1 GENERAL

### 1.01 SCOPE

- A. Furnish all labor, materials and equipment, and perform all work to install peel and stick polyethylene faced rubberized asphalt flashing as shown on the drawings and as specified herein.

### 1.02 RELATED DOCUMENTS

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

### 1.03 SUBMITTALS

- A. Submit manufacturer's data, installation instructions, and 6" square samples of specified sheet materials to the Architect for approval.

### 1.04 PROJECT CONDITIONS

- A. Store flashing materials in protected location safe from soiling with and water with temperatures maintained above 50° F.
- B. Do not store materials exposed to direct sunlight.

## PART 2 PRODUCTS

### 2.01 MANUFACTURER

- A. Provide one of the following product systems by the indicated manufacturer:
  - 1. Vycor Plus self-adhering flashing as manufactured by Grace Construction Products, 62 Whittemore Avenue, Cambridge, MA 02140, 866-333-3726, Fax: 410-431-7281
  - 2. BT020XL self-adhering flashing as manufactured by Protecto Wrap Company, 2255 South Delaware Street, Denver, CO 80223, Phone: 800-759-9727 or 303-777-3001, Fax: 303-777-9273
  - 3. Tyvek® Flashing System as manufactured by DuPont, P.O. Box 80728, Wilmington, Delaware 19880-0728, 800-448-9835

### 2.02 SURFACE PRIMERS:

- A. Primer or Spray Adhesive must be used on weathered surfaces, masonry, concrete, OSB sheathing and fiberglass matt faced gypsum sheathing. Primer or spray adhesive must be used in applications with temperatures below 45° F.

## PART 3 EXECUTION

### 3.01 COORDINATION

- A. Coordinate the installation of sheet metal work with the work of other trades, e.g., thru-wall flashing and counter-flashing and with the installation of windows and doors.

### 3.02 CONDITIONS

- A. Surfaces should be clean, dry, free of dirt and other foreign matter.
- B. There should be no solvent-based caulks used in conjunction with peel and stick flashing.
- C. Peel and stick flashing should be applied at a temperature above 45° F (7° C). For applications from 20° F to 45° F (-6° C to 7° C), the material must be stored in a warm area prior to use.

- D. Work shall be installed as detailed and in accordance with the manufacturer's latest printed instructions, unless otherwise approved by the Architect in writing. Requests for permission to use alternate materials, methods, and details shall be submitted to the Architect, in writing, and shall fully describe the proposed alternatives and the reasons for such proposed changes.

### 3.03 PRIMER APPLICATION

- A. Apply primer to all surfaces by roller or brush.
- B. Primed surface shall be free of runs, puddles or excessive primer as this could cause blistering. Brush or roll out all primer puddles or drips immediately.
- C. Prime only as much area as can be covered in half a day's work. Re-prime areas not covered in half a day's work with a light coat of Primer.
- D. The opened containers, when not in use, should have the lids replaced so as to lessen the evaporation of the solvents.
- E. Some bubbling in the primer may occur on the surface as it cures. This has no effect on the performance of the product and will smooth out as the membranes are applied.

### 3.04 SPRAY ADHESIVE APPLICATION

- A. Shake can before using.
- B. Turn spray tip so arrow points to dot on rim.
- C. Hold can 6 - 8 inches from surface to be sprayed and apply to surface.
- D. After use, invert can, depress spray tip until spray is free of adhesive. Clean spray tips with turpentine.
- E. Clean oversprayed areas with a mix of 25% - 30% water added to isopropyl alcohol.

### 3.05 INSTALLING FLASHING

- A. Self-Adhered Flashing must be continuously supported by the substrate and must not span or bridge joints, gaps or voids in excess of 1/4" (6.4 mm). End laps that occur in subsequent lengths must maintain a minimum overlap of 2" (51 mm).
- B. Begin installation at the bottom of openings and work toward the top lapping all joints to excluded moisture penetration.
- C. Move along opening or joint, being careful to put flashing as evenly as possible over the opening and avoiding fishmouths along the edges.
- D. Press flashing firmly into place with heavy hand pressure as soon as possible, to ensure continuous and intimate contact with the substrate.
- E. If wrinkles develop, carefully cut out affected area and replace in the similar procedure outlined above. The repair piece also must be pressed into place with heavy hand pressure as soon as possible to ensure continuous and intimate contact with the substrate.
- F. Rolling the flashing is essential to gain 100% surface contact of the flashing adhesive to the substrate and will minimize trapping air beneath the tape.
- G. Care should be taken not to leave the membrane exposed to direct sunlight for over 120 days.
- H. Do not stretch the flashing membrane. Stretching will adversely affect the adhesion of the product.

- I. Lap building wrap material 4" on top of flashing and seal the building wrap to flashing.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems.
- B. Firestopping of joints and penetrations in fire-resistance-rated and smoke-resistant assemblies.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 01 70 00 - Execution and Closeout Requirements: Cutting and patching.
- C. Section 07 81 00 - Applied Fire Protection.
- D. Section 09 21 16 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

1.03 REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems.
- B. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.
- C. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestops.
- D. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.
- E. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus.
- F. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies.
- G. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- H. ITS (DIR) - Directory of Listed Products; current edition.
- I. FM (AG) - FM Approval Guide; current edition.
- J. SCAQMD 1168 - Adhesive and Sealant Applications.
- K. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.
- L. UL (DIR) - Online Certifications Directory; Current Edition.
- M. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- C. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.

1.05 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
  - 1. Listing in UL (FRD) will be considered as constituting an acceptable test report.
  - 2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at [www.icc-es.org](http://www.icc-es.org) will be considered as constituting an acceptable test report.
  - 3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section and:
  - 1. Trained by manufacturer.
  - 2. Verification of minimum five years documented experience installing work of this type.
  - 3. Verification of at least ten satisfactorily completed projects of comparable size and type.

1.06 MOCK-UPS

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Install one firestopping assembly representative of each fire rating design required on project.
  - 1. Where one design may be used for different penetrating items or in different wall constructions, install one assembly for each different combination.
  - 2. Where firestopping is intended to fill a linear opening, install at least 1 linear foot of firestopping.
- C. Obtain approval of authorities having jurisdiction (AHJ) before proceeding.
- D. If accepted by AHJ and Architect, mock-up may remain as part of this work. Remove and replace mock-ups not accepted.

1.07 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Firestopping Manufacturers:
  - 1. 3M Fire Protection Products: [www.3m.com/firestop](http://www.3m.com/firestop).
  - 2. A/D Fire Protection Systems Inc: [www.adfire.com](http://www.adfire.com).
  - 3. Hilti, Inc: [www.hilti.com](http://www.hilti.com).
  - 4. Nelson FireStop Products: [www.nelsonfirestop.com](http://www.nelsonfirestop.com).
  - 5. Specified Technologies Inc: [www.stifirestop.com](http://www.stifirestop.com).
  - 6. Tremco Commercial Sealants & Waterproofing; TREMstop Acrylic: [www.tremcosealants.com](http://www.tremcosealants.com).
  - 7. Substitutions: 01 25 00 - Substitution Procedures.

2.02 MATERIALS

- A. Firestopping Materials: Any materials meeting requirements.
- B. Volatile Organic Compound (VOC) Content: Provide products having VOC content lower than that required by SCAQMD 1168.
- C. Mold and Mildew Resistance: Provide firestopping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.

- D. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.
- E. Fire Ratings: Refer to drawings for required systems and ratings.

#### 2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. Perimeter Fire Containment Firestopping: Use system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of floor assembly.
  - 1. Movement: Provide systems that have been tested to show movement capability as indicated.
  - 2. Temperature Rise: Provide systems that have been tested to show T Rating as indicated.
  - 3. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
  - 4. Where floor assembly is not required to have a fire rating, provide systems that have been tested to show L Rating as indicated.
- B. Head-of-Wall (HW) Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of wall assembly.
  - 1. Movement: Provide systems that have been tested to show movement capability as indicated.
- C. Floor-to-Floor (FF), Floor-to-Wall (FW), Head-of-Wall (HW), and Wall-to-Wall (WW) Joints, Except Perimeter, Where Both Are Fire-Rated: Use system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.
  - 1. Movement: Provide systems that have been tested to show movement capability as indicated.
  - 2. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
  - 3. Watertightness: Provide systems that have been tested to show W Rating as indicated.
  - 4. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.
- D. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
  - 1. Temperature Rise: Provide systems that have been tested to show T Rating as indicated.
  - 2. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
  - 3. Watertightness: Provide systems that have been tested to show W Rating as indicated.
  - 4. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

#### 2.04 FIRESTOPPING SYSTEMS

- A. Firestopping: Any material meeting requirements.
  - 1. Fire Ratings: See drawings for required systems and ratings.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.

#### 3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.
- C. Install backing materials to prevent liquid material from leakage.

#### 3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

- B. Do not cover installed firestopping until inspected by Owner's Independent Testing Agency.
- C. Do not cover installed firestopping until inspected by authorities having jurisdiction.
- D. Install labeling required by code.

3.04 FIELD QUALITY CONTROL

- A. Independent Testing Agency: Inspection agency employed and paid by Owner, will examine penetration firestopping in accordance with ASTM E2174 and ASTM E2393.
- B. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

3.05 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.06 PROTECTION

- A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

## PART 1 GENERAL

### 1.01 SCOPE

- A. Joint sealants for the following locations:
  - 1. Joints in exterior vertical surfaces and non-traffic horizontal surfaces as indicated below:
    - a. Perimeter joints between wall materials and frames of doors and windows.
    - b. Joints between different materials.
    - c. Other joints as indicated on the drawings.
    - d. Openings around pipes projecting through exterior walls.
  - 2. Joints in exterior horizontal traffic bearing surfaces as indicated below:
    - a. Control and expansion joints in concrete paving.
  - 3. Interior joints in vertical and vertical surfaces as indicated below:
    - a. Joints between different materials.
    - b. Joints between plumbing fixtures and adjacent materials.
    - c. Joints around pipes projecting through interior walls.

### 1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.
- B Sealants in connection with ductwork is specified in Division 23.

### 1.03 SUBMITTALS

- A Submit manufacturer's product and application data on products specified.
- B Submit color charts on products requiring color selection.
- C Product test reports.

### 1.04 QUALITY ASSURANCE

- A Engage an experienced installer who has completed joint sealant applications similar in material, design, and extent to that indicated for the project that have resulted in construction with a record of successful in-service performance.

### 1.05 ENVIRONMENTAL CONDITIONS

- A Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer.
  - 2. When joint substrates are wet.
  - 3. Where joint widths are less than allowed by joint sealant manufacturer for application indicated.
  - 4. Until contaminant capable of interfering with their adhesion are removed from joint substrates.

## PART 2 PRODUCTS

### 2.01 GENERAL

- A Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under the conditions of service and application as demonstrated by the manufacturer based on testing and field experience.
- B Match colors indicated by reference.

2.02 MATERIALS

- A Sealant for caulking of control joints in concrete slabs shall be a two-part, Jet-Fuel-Resistant, non-sag, Polyurethane Rubber Sealant for Concrete: Pourable, chemically curing elastomeric formulation complying with the following requirements relative to formulation and with ASTM C 920 for Type, Grade, Class, and Uses indicated.
1. Urethane formulation: Type M, Class 25, Uses T, M, and O as applicable to joint substrates.
  2. Grade P for joints in horizontal paved surfaces.
  3. Grade NS for vertical and other joints where installation of a Grade P (self-leveling) sealant would result in sealant flowing out of joint.
- B Sealant for all exterior caulking except as noted, and at cabinets shall be a multicomponent non-sagging urethane sealant complying with ASTM C920 for type M, Grade NS, class 25, Uses A, G, M, and O as applicable to joint substrates. Provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements of ASTM C920 for uses indicated. Acceptable manufacturers include DAP, Pecora, Sonneborn, and Tremco.
1. Additional Movement Capability: 50 percent movement in extension and 50 percent in compression for a total of 100 percent movement.
- C Sealant for exterior caulking in conjunction with exterior insulation and finish system shall be a single component non-sagging, neutral-curing, ultra low-modulus silicone building sealant complying with ASTM C-920 for Type S, Grade NS, class 25, Uses: A, M, and O as applicable to joint substrates. Provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements of ASTM C920 for uses indicated. Acceptable manufacturers include Dow Corning, Pecora and Tremco.
1. Additional movement capability: 100 percent in extension and 50 percent in compression for a total of 150 percent movement.
- D Sealant for interior use unless otherwise specified shall be a paintable type equal to DAP Acrylic Latex Caulk, Pecora AC-20 Acrylic Latex, or Tremco Acrylic Latex Caulk.
- E Sealant for interior use in conjunction with plumbing fixtures shall be a low-modulus nonacid-curing silicone sealant, type S, Grade NS, Class 25, uses: A, G, and O as applicable to joint substrates. Provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements of ASTM C920 for uses indicated. Acceptable manufacturers include DAP, Pecora, Sonneborn, and Tremco.
1. Additional Movement Capability: 100 percent movement in extension and 50 percent in compression for a total of 150 percent movement.
- F Primer shall be the type recommended by the sealant manufacturer and shall be supplied by the manufacturer of the sealant used.
- G Backup material and joint fillers shall be non-staining, compatible with sealant and primer used, and of a resilient nature. Raveled strands of non-staining rope fiber or cotton wicking may be used as filler in deep joints but the filler backing up the sealant shall be rod shaped foam neoprene, foam polyethylene, or hollow vinyl extrusions. Filler material impregnated with oil, bitumen, or similar substances shall not be used in any case.
- H Bond breakers shall be polyethylene tape, pressure sensitive masking tape, or equal, as recommended by the sealant manufacturer.
- I Preformed Foam Sealants: Manufacturer's standard preformed, precompressed, impregnated open cell foam sealant manufactured from high density urethane foam impregnated with a nondrying water repellent agent: factory produced in precompressed sizes and in roll or stick form to fit joint widths indicated and to

develop watertight and airtight seal when compressed to the degree specified by the manufacturer, and complying with the following requirements:

1. Permanently mildew-resistant non-migratory, non-staining, and compatible with joint substrates and other joint sealants.
2. Impregnating Agent: Chemically stabilized acrylic.
3. Density: Manufacturer's standard.
4. Backing: None
5. Product shall be Colorseal as manufactured by Emseal Joint Systems, Westborough, MA. or equal product of Willseal or Tremco Illbruck.

## 2.03 JOINT SEALANT BACKING

- A General: Provide sealant backings of material and type that are non-staining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B Plastic Foam Joint Fillers: Preformed, compressible, resilient, non-staining, non-waxing, non-extruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance
- C Closed-cell polyethylene foam, non-absorbent to liquid water and gas, non-outgassing in unruptured state.
- D Elastomeric Tubing Joint Fillers: Neoprene, butyl EPDM, or silicone tubing complying with ASTM D 1056, non-absorbent to water and gas, capable of remaining resilient at temperatures down to -26° F (-32° C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.
- E Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

### 3.02 PREPARATION

- A Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer and the following requirements:
1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  2. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
  3. Remove laitance and form release agents from concrete.
  4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

- B Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.03 INSTALLATION OF JOINT SEALANTS

- A General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B Sealant Installation Standard: Comply with recommendations of ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C Install joint filler of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 1. Do not leave gaps between ends of joint fillers.
  - 2. Do not stretch, twist, puncture, or tear joint fillers.
  - 3. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.
- D Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes, and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the time sealant backings are installed.
- E Tooling of Non-sag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
  - 1. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
- F Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with sealant manufacturer's directions for installation methods, materials, and tools that produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformation with sealant manufacturer's recommendations.

### 3.04 CLEANING

- A Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.05 PROTECTION

- A Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so that and installations with repaired areas are indistinguishable from original work.

END OF SECTION



PART 1 GENERAL

1.01 WORK INCLUDED

- A Furnish and install all exterior and interior hollow metal doors, steel doorframes and frames for fixed glass windows, and all necessary incidental work in connection therewith.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.
1. Section 07 92 00 - Joint Sealants.
  2. Section 08 71 00 - Door Hardware.
  3. Section 08 80 00 – Glazing.
  4. Section 08 88 53 – Security Glazing.
  5. Section 09 91 13 – Exterior Painting.
  6. Section 09 91 23 – Interior Painting.

1.03 SUBMITTALS

- A Submit schedules and shop drawings of hollow metal doors and frames to the Architect for approval before any work is fabricated.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A Doors and frames shall be products as specified, manufactured by Steelcraft Manufacturing Company, Cincinnati, Ohio; or equal products of the following manufacturers:
1. Mesker Brothers, St. Louis, Mo.
  2. Metal Products, Inc., Corbin, Kentucky
  3. Curries Corporation, Mason City, Iowa

2.02 MATERIALS

- A Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z (12G) coating designation; mill phosphatized.
1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- D Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

2.03 DOORS

- A Doors shall be full flush construction 1-3/4" thick, made of cold, 16 gauge, cold rolled steel. Doors shall be Type B-16. Doors shall be reinforced, stiffened, sound deadened and insulated with impregnated kraft honeycomb core completely filling the inside of the doors and laminated to both inside faces of the panels.

1. All doors shall have mechanical edge seam or be fully welded and ground smooth if joint is in center of door edge.
  2. Hinge and lock edge shall have 1/8" in 2" bevel.
  3. Top and bottom #14 gauge cold, rolled steel reinforcing channels shall be spot welded within the door.
  4. Top edges of exterior doors shall be finished with flush metal closure.
  5. Hinge reinforcing shall be 8-gauge steel.
  6. Lock reinforcing shall be #16 gauge.
  7. Closer reinforcing shall be #12 gauge.
  8. Adequate reinforcing shall be provided for other hardware as required.
  9. Mortise, drill and tap for hardware, except that doors be drilled and tapped for surface-mounted hardware in the field.
- B Glass light openings shall be provided with removable metal moldings secured in place with oval head countersunk screws.
- C Glass in fire rated doors shall be 1/4" wire glass. Glass in non-label doors shall be 1/4" thick tempered clear.

#### 2.04 FRAMES

- A Frames shall be flush frames with 2" wide faces, formed of #16 gauge steel. Interior frames shall be fabricated from cold rolled steel. Exterior frames shall be fabricated from metallic coated steel sheet. Frames shall be set up and welded and doorframes shall be provided with temporary spreaders at bottom. Mitered corners shall have reinforcements with integral tabs for secure and easy interlocking of jambs to head. Strike jambs shall be supplied with three factory installed rubber bumpers. Mullions at pairs of doors shall be removable type.
1. Frames shall have 8 gauge steel hinge reinforcements and be mortised for hinges specified.
  2. Strike reinforcements shall be #16 gauge.
  3. Provide metal plaster guards for all mortise cutouts. Reinforcements for surface closers shall be #12 gauge.
  4. Adequate reinforcing shall be provided for other hardware as required.
  5. Mortise, drill and tap for hardware, except that frames shall be drilled and tapped for surface-mounted hardware in the field.
- B Frames shall be furnished with a minimum of six wall anchors and two adjustable base anchors of manufacturer's standard design at masonry walls and a minimum of six wall anchors (2 base) at stud walls. Anchors for labeled frames shall be UL approved type.
- C Steelcraft unitized weatherstripping will be acceptable in lieu of weatherstripping specified for exterior doors in Finish Hardware Section herein.

#### 2.05 TORNADO RESISTANT DOORS

- A Door Systems for Federal Emergency Management Agency (FEMA) community shelters and other areas of refuge shall resist the design wind pressures and missile impact loads as detailed in the National Performance Criteria for Tornado Shelters as published by FEMA.
1. Door and frame system shall meet the requirements of ANSI A250.8 and ANSI 250.6 with hardware locations in accordance with ANSI/DHI A115.
  2. Door and frame system must be tested in accordance with FEMA 361 performance standard. In the pressure test, door and frame system must perform to an internal pressure of 250 psf. Door must successfully pass several impacts by a 15 pound missile launched at 100 mph. Maximum system deflection shall not exceed 4 inches from the wall plane inside the room.

- B Hardware Locations and Reinforcements:
1. Hardware locations on doors and frames shall be in accordance with the system manufacturer's standard locations.
  2. Doors shall be mortised, reinforced and function holes prepared in accordance with the specified hardware. Through bolt holes, attachment holes, or drilling and tapping for surface hardware, shall be done by others.
- C Materials:
1. Doors, frames and frame components shall be manufactured from hot-dipped galvanized steel having an A60 zinc-iron alloy coating conforming to ASTM designations A653 and A924.
  2. All doors and frames shall be cleaned, phosphatized and finished as standard with one coat of baked-on, rust inhibiting prime paint in accordance with ANSI A250.10.
- D Doors shall be full flush construction 1-3/4" thick, made of 14 gauge, cold-rolled steel. Doors shall be Paladin Series. Doors shall be reinforced, stiffened, sound deadened and insulated with impregnated kraft honeycomb core completely filling the inside of the doors and laminated to both inside faces of the panels.
1. Doors shall have continuous vertical mechanical interlocking joints at lock and hinge edges with edge seams welded, filled and ground smooth.
  2. Doors shall have beveled hinge and lock edges.
  3. Top and bottom #14 gauge cold, rolled galvanized steel reinforcing channels shall be projection welded to face sheets on 4" centers.
  4. Top edges of exterior doors shall be finished with flush metal closure.
  5. Hinge reinforcing shall be 7-gauge galvanized steel projection welded to the edge of the door.
  6. Door faces shall be reinforced by 18 gage vertical stiffeners manufactured from galvanized steel conforming to ASTM designations A653 and A924 and welded to each face sheet.
  7. Lock stiles shall be reinforced by full-height 12 gage lock reinforcing channels.
  8. Adequate reinforcing shall be provided for other hardware as required by manufacturer.
  9. Mortise, drill and tap for hardware, except that doors be drilled and tapped for surface-mounted hardware in the field.

## 2.06 TORNADO RESISTANT FRAMES

- A Interior frames shall be fabricated from cold rolled steel. Exterior frames shall be fabricated from metallic coated steel sheet. Door frames shall be provided with temporary spreaders at bottom where required. Strike jambs shall be supplied with three factory installed rubber bumpers.
1. Frames shall be fabricated from 14 gage hot-dipped galvanized steel having an A60 zinc-iron alloy coating conforming to ASTM designations A653 and A924.
  2. Hinge and strike jambs shall have 2" faces, heads shall be 2" face.
  3. Corner connections shall be set-up and arc welded, ground, dressed smooth and painted.
  4. Hinge reinforcements shall be 7 gage galvanized steel prepared for 4 1/2" x 4 1/2", standard weight hinges.
  5. Strike reinforcements shall be #16 gauge.
  6. Provide metal plaster guards for all mortise cutouts. Reinforcements for surface closers shall be #12 gauge.
  7. Adequate reinforcing shall be provided for other hardware as required.
  8. Mortise, drill and tap for hardware, except that frames shall be drilled and tapped for surface-mounted hardware in the field.
- B Frames shall be anchored according to the manufacturer's recommendation. Anchors for labeled frames shall be UL approved type.
- C Steelcraft unitized weatherstripping will be acceptable in lieu of weatherstripping specified for exterior doors in Section 08700, "Finish Hardware".

2.07 SOUND SEALS

- A Openings noted on the schedule to have sound seals shall be fitted with the following:
1. Jamb and Head: Zero 328
  2. Door Bottom: Zero 364, 365 or 366 (coordinate with jamb seals).
  3. Astragal seals: Zero 155/55
  4. Provide a flat, solid threshold similar to Pemco 14\_1in order for the door bottom seal to operate properly.
- B Seals shall be the product of Zero International, 415 Concord Avenue, Bronx, NY 10455, Ph.: (718) 585-3230, Fax.: (718) 292-2243 or equal product by Pemco or Reese.

2.08 LOCATION OF HARDWARE

- A Finishing hardware is specified to be furnished in "Finish Hardware" section under Division 8. Doors and frames shall be prepared for hardware from templates of the hardware to be furnished.
- B Unless otherwise specifically indicated, hardware shall be located as follows:
1. Knob locks, handle sets, and exit bolt locks; 36" from finish floor to centerline of strike.
  2. Deadlocks: 42" from finish floor to centerline of strike.
  3. Door Pulls and Single Push Bars: 42" from finish floor to centerline of grip or to centerline of push bar.
  4. Push Plates: 42" from finish floor to centerline of strike.
  5. Hinges: Top hinge 9-3/4" from head of frame to centerline of hinge; bottom hinge 10-3/8" from finished floor to centerline of hinge; intermediate hinges equally spaced from top and bottom hinges. Locate top and bottom hinges at toilet stall doors 6" from top and bottom of door.

2.09 DOOR CLEARANCE

- A Doors shall have 1/8" clearance at top, 3/32" clearance at sides, and 5/8" clearance above finished floor at the bottom, unless noted on the drawings to be undercut.

2.10 FINISH

- A Doors and frames shall be cleaned, bonderized, and finished with one coat of baked-on prime paint.

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 standard steel doors and frames.
1. Examine roughing-in for embedded and built-in anchors to verify actual locations of standard steel frame connections before frame installation.
  2. Delete first subparagraph below if not required.
  3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
  4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A Remove welded-in shipping spreaders installed at factory.
- B Prior to installation and with installation spreaders in place, adjust and securely brace standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:

1. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.

C Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

### 3.03 INSTALLATION

A General: Provide doors and frames of sizes, thicknesses, and designs indicated. Install standard steel doors and frames plumb, rigid, properly aligned, and securely fastened in place with all clearances accurately maintained; comply with Drawings and manufacturer's written instructions.

B Standard Steel Frames: Install standard steel frames for doors and other openings, of size and profile indicated. Comply with SDI 105.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
  - a. At fire-protection-rated openings, install frames according to NFPA 80.
  - b. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
  - c. Install frames with removable glazing stops located on secure side of opening.
  - d. Install door silencers in frames before grouting.
  - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
  - f. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
  - g. Apply bituminous coating to backs of frames that are filled with mortar, grout, and plaster containing antifreezing agents.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with postinstalled expansion anchors.
  - a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar as specified in Division 4 Section "Unit Masonry Assemblies."
5. Concrete Walls: Solidly fill space between frames and concrete with grout. Install grout in lifts and take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable wedged or bolted anchorage to frame jamb members.
9. Installation Tolerances: Adjust standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:

- a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
    - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.
  - C Standard Steel Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
    - 1. Non-Fire-Rated Standard Steel Doors:
      - a. Jambs and Head: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
      - b. Between Edges of Pairs of Doors: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
      - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch (9.5 mm).
      - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch (19 mm).
    - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
  - D Tornado Resistant Doors and Frames: Install per manufacturer's specific system installation requirements.
    - 1. Attachment to CMU shall be as follows:
      - a. Install frame with wire metal anchors at 8 inches o.c. vertically.
      - b. Entire frame shall be grouted solid (including head).
  - E Smoke-Control Doors: Install doors according to NFPA 105.
  - F Where labeled fire doors are called for on the drawings, the doors and frames shall meet the requirements of the Underwriters' Laboratories and the National Fire Protection Association and shall bear UL label.
- 3.04 ADJUSTING AND CLEANING
- A Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including standard steel doors or frames that are warped, bowed, or otherwise unacceptable.
  - B Clean grout and other bonding material off standard steel doors and frames immediately after installation.
  - C Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.
  - D Galvannealed Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-fire-rated hollow metal frames for non-hollow metal doors.
- B. Fire-rated hollow metal frames for non-hollow metal doors.
- C. Sound-rated hollow metal frames for non-hollow metal doors.
- D. Hurricane-resistant hollow metal frames for non-hollow metal doors.
- E. Tornado-resistant hollow metal frames for non-hollow metal doors.
- F. Interior and exterior glazed borrowed lite frames.

1.02 RELATED REQUIREMENTS

- A. Section 08 14 16 - Flush Wood Doors: Non-hollow metal door for hollow metal frames.
- B. Section 08 71 00 - Door Hardware: Hardware, silencers, and weatherstripping.
- C. Section 08 80 00 - Glazing: Glazed borrowed lites.
- D. Section 09 91 13 - Exterior Painting: Field painting.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100).
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- E. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
- G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
- H. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- I. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames.
- J. FBC TAS 201 - Impact Test Procedures; Testing Application Standard.
- K. FBC TAS 202 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components Using Uniform Static Air Pressure; Testing Application Standard.
- L. FBC TAS 203 - Criteria for Testing Products Subject To Cyclic Wind Pressure Loading; Testing Application Standard.
- M. FEMA P-361 - Safe Rooms for Tornadoes and Hurricanes: Guidance for Community and Residential Safe Rooms.
- N. FLA (PAD) - Florida Building Code Online - Product Approval Directory; Current Edition.
- O. ICC A117.1 - Accessible and Usable Buildings and Facilities.

- P. ICC 500 - ICC/NSSA Standard for the Design and Construction of Storm Shelters; National Storm Shelter Association.
- Q. ITS (DIR) - Directory of Listed Products; current edition.
- R. Miami (APD) - Approved Products Directory; Miami-Dade County; Current Edition.
- S. NAAMM HMMA 805 - Recommended Selection and Usage Guide for Hollow Metal Doors and Frames.
- T. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames.
- U. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames.
- V. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames.
- W. NAAMM HMMA 850 - Fire-Protection and Smoke Control Rated Hollow Metal Door and Frame Products.
- X. NAAMM HMMA 860 - Guide Specifications for Hollow Metal Doors and Frames.
- Y. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames.
- Z. NAAMM HMMA 865 - Guide Specifications for Sound Control Hollow Metal Doors and Frames.
- AA. NAAMM HMMA 866 - Guide Specifications for Stainless Steel Hollow Metal Doors and Frames.
- AB. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.
- AC. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives.
- AD. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames.
- AE. UL (DIR) - Online Certifications Directory; Current Edition.
- AF. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- AG. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

#### 1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced grade standard.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.
- D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
- E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.
- F. Manufacturer's Qualification Statement.
- G. Installer's Qualification Statement.

#### 1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store in accordance with applicable requirements and in compliance with standards and/or custom guidelines as indicated.

- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Hollow Metal Frames with Integral Casings:
1. Ceco Door, an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  2. Curries, an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  3. Fleming Door Products, an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  4. Republic Doors, an Allegion brand: [www.republicdoor.com](http://www.republicdoor.com).
  5. Steelcraft, an Allegion brand: [www.allegion.com](http://www.allegion.com).
  6. Substitutions: 01 25 00 - Substitution Procedures.

### 2.02 PERFORMANCE REQUIREMENTS

- A. Refer to Door and Frame Schedule on the drawings for frame sizes, fire ratings, sound ratings, finishing, door hardware to be installed, and other variations, if any.
- B. Door Frame Type: Provide hollow metal door frames with integral casings.
- C. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
- D. Accessibility: Comply with ICC A117.1 and ADA Standards.
- E. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.
- F. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior frame that is also indicated as being sound-rated must comply with the requirements specified for exterior frames and for sound-rated frames; where two requirements conflict, comply with the most stringent.
- G. Hardware Preparations, Selections and Locations: Comply with BHMA A156.115, NAAMM HMMA 830, NAAMM HMMA 831 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- H. Mullions for Pairs of Doors: Removable type, with profile similar to jambs.
- I. Transom Bars: Fixed, of profile same as jamb and head.
- J. Frames for Interior Glazing or Borrowed Lites: Construction and face dimensions to match door frames, and as indicated on drawings.

### 2.03 HOLLOW METAL DOOR FRAMES WITH INTEGRAL CASINGS

- A. Exterior Door Frames: Face welded type.
1. Based on NAAMM HMMA Custom Guidelines:
    - a. Comply with guidelines of NAAMM HMMA 860 for Hollow Metal Doors and Frames.
    - b. Performance Level 2 - Moderate Duty, in accordance with NAAMM HMMA 805.
    - c. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
    - d. Frame Metal Thickness: 18 gauge, 0.042 inch, minimum.
    - e. Zinc Coating: Manufacturer's standard coating thickness; ASTM A653/A653M.
  2. Frame Finish: Factory primed and field finished.
  3. Weatherstripping: See Section 08 71 00.
- B. Interior Door Frames, Non-Fire Rated: Face welded type.
1. Based on NAAMM HMMA Custom Guidelines:
    - a. Comply with guidelines of NAAMM HMMA 860 for Hollow Metal Doors and Frames.
    - b. Performance Level 2 - Moderate Duty, in accordance with NAAMM HMMA 805.
    - c. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
    - d. Frame Metal Thickness: 18 gauge, 0.042 inch, minimum.

- e. Zinc Coating: Manufacturer's standard coating thickness; ASTM A653/A653M.
- 2. Frame Finish: Factory primed and field finished.

C. Fire-Rated Door Frames: Face welded type.

- 1. Based on NAAMM HMMA Custom Guidelines: Comply with NAAMM HMMA 850 requirements for fire-rated frames.
  - a. Comply with guidelines of NAAMM HMMA 860 for Hollow Metal Doors and Frames.
  - b. Performance Level 2 - Moderate Duty, in accordance with NAAMM HMMA 805.
  - c. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
  - d. Frame Metal Thickness: 18 gauge, 0.042 inch, minimum.
  - e. Zinc Coating: Manufacturer's standard coating thickness; ASTM A653/A653M.
- 2. Fire Rating: As indicated on Door and Frame Schedule, tested in accordance with UL 10C or NFPA 252 ("positive pressure fire tests").
- 3. Temperature-Rise Rating (TRR) Across Framed Door Thickness: In accordance with local building code and authorities having jurisdiction.
- 4. Provide units listed and labeled by ITS (DIR) or UL (DIR).
  - a. Attach fire rating label to each fire rated unit.
- 5. Smoke and Draft Control Doors: Self-closing or automatic closing framed doors in accordance with NFPA 80 and NFPA 105, with fire-resistance-rated wall construction rated the same or greater than the fire-rated doors, and the following;
  - a. Maximum Air Leakage: 3.0 cfm/sq ft of framed door opening at 0.10 inch w.g. pressure, when tested in accordance with UL 1784 at both ambient and elevated temperatures.
  - b. Gasketing: Provide gasketing or edge sealing as necessary to achieve leakage limit.
  - c. Label: Include the "S" label on fire-rating label of door.
- 6. Frame Finish: Factory primed and field finished.

F. Tornado-Resistant Door Frames: Face welded type.

- 1. Design and size door and frame components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M.
  - a. Design Wind Loads: Comply with requirements of authorities having jurisdiction.
  - b. Wind-Borne Debris Resistance: Door and frame components shall have FLA (PAD) approval, Miami (APD) approval, or UL (DIR) approval for Large and Small Missile impact and pressure cycling at design wind loads.
- 2. Tornado Shelter Application: Comply with ICC 500 standard.
  - a. Commercial: Designed and tested to comply with FEMA P-361 for community shelter door assembly guidelines.
- 3. Based on NAAMM HMMA Custom Guidelines:
  - a. Comply with guidelines of NAAMM HMMA 866 for Stainless-Steel Hollow Metal Doors and Frames.
  - b. Performance Level 2 - Moderate Duty, in accordance with NAAMM HMMA 805.
  - c. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
  - d. Frame Metal Thickness: 16 gauge, 0.053 inch, minimum.
- 4. Stainless-Steel, Type 304, for Severely Corrosive Conditions: No. 4 - General purpose polished finish, complying with ASTM A666.

2.04 ACCESSORIES

- A. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- B. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install frames in accordance with manufacturer's instructions and related requirements of specified frame standards or custom guidelines indicated.
- B. Install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Comply with glazing installation requirements of Section 08 80 00.
- E. Install door hardware as specified in Section 08 71 00.
- F. Coordinate installation of electrical connections to electrical hardware items.

3.04 TOLERANCES

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

3.05 SCHEDULE

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

END OF SECTION



PART 1 GENERAL

1.01 SCOPE

- A Provide all labor, materials, equipment, and supervision necessary to furnish and install wood doors as shown on the drawings and specified herein.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.
1. Section 08 11 13 - Hollow Metal Doors and Frames.
  2. Section 08 71 00 - Door Hardware.
  3. Section 09 91 23 - Interior Painting.

1.03 SUBMITTALS

- A. Product Data: Submit door manufacturer's product construction data, and specifications for each type of wood door, including details of core and edge construction, trim detail for lite openings and similar components.
- B. Specific Product Warranty: Submit a copy of door manufacturer's standard door warranty. Door warranty shall provide for reasonable repair or replacement of the door as originally furnished. Manufacturer may, per its discretion, elect to use either its own or third party resources to resolve warranty claims.
- C. Shop Drawings: Submit shop drawings indicating location, size, thickness, and hand of each door; elevation of each kind of door. Provide the following information:
1. Hardware types and locations. Indicate dimensions and locations of mortises and holes for hardware of factory machined doors.
  2. Location of Hardware blocking where specified.
  3. Vision panel or louver cutout size and location
  4. Indicate requirements for veneer matching.
  5. Indicate fire label requirements including fire rating time duration, maximum temperature rise requirements, and smoke label requirements.
  6. Indicate routing of electrical raceways and dimensions and locations of cutouts in wood doors to accept electric hardware devices.
  7. Pre-finish system type and approved color(s).
- D. Samples:
1. Color samples for factory pre-finishing. Manufacturer must submit samples of not less than 3 - 5" x 8" size on specified veneer species. The sample should reasonably represent the color range of the veneer species selected.

1.04 REFERENCE STANDARDS

- A. Window and Door Manufacturers Association WDMA I.S. 1-A.
- B. WDMA "How to Store, Handle, Finish, Install and Maintain Wood Doors" published by the Window and Door Manufacturers Association
- C. ANSI/HPVA HP-1-2000 - American National Standard for Hardwood and Decorative Plywood
- D. NFPA 80 - Fire Doors and Windows
- E. NFPA 252 - Standard Methods of Fire Tests for Door Assemblies
- F. Underwriters' Laboratories - UL 10C (positive pressure) - Fire Tests of Door Assemblies whichever applies.

- G. ITS (Warnock Hersey) - Certification Listings for Fire Doors
- H. ASTM E90-02 - Measurement of Airborne Sound Transmission Loss of Building Partitions and Element.

#### 1.05 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer specializing in manufacturing products specified in Section 1.3 above, with a minimum of five years documented door building experience under the same ownership.
- B. Meet or exceed WDMA I.S.1-A Custom Grade, AWI (latest version) Custom Grade and / or WIC Custom Grade.
- C. Labeled Doors shall be listed and conform to the requirements of:
  - 1. Intertek Testing Services-Warnock Hersey (ITS-WH) or Underwriters Laboratories (UL).
- D. Quality Standard: Comply with AWI's "Architectural Woodwork Quality Standards Illustrated. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
  - 1. Non-fire-rated doors shall comply with AWI requirements for PC-5 construction. P.C.7 doors will not be accepted.
- E. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
  - 1. 20 minute rated doors shall comply with AWI requirements for DFP-20 construction.
  - 2. 45, 60, and 90 minute rated doors shall comply with AWI requirements for Fire Rated Mineral Core; DFM-45, -60, -90 construction.
  - 3. Temperature-Rise Rating: At exit enclosures and where indicated on drawings, provide doors that have a temperature-rise rating of 450 deg F (250 deg C) maximum in 30 minutes of fire exposure.

#### 1.06 CONSTRUCTION REQUIREMENTS

- A. All doors to have core, 2 stiles (one or two piece laminated) and 2 rails (one or two piece laminated). No voids permitted. Except where noted Type I (waterproof) adhesive is to be used.
- B. Non-Fire Rated Wood Doors - All solid core flush wood doors shall meet WDMA Door Grade
  - 1. Heavy Duty
  - 2. PC - Particle Core. Stiles and rails securely bonded to the core and entire unit abrasively planing prior to application of faces to assure uniform thickness of all components.
- C. Fire Rated Wood Doors: Where fire-resistance classifications are shown or scheduled, provide doors which are like the non-fire rated doors above but comply with the AWI standards for fire rated doors. Doors will meet the requirements of NFPA No. 80 "Standard for Fire Doors and Windows". Fire rated doors shall bear the label of an independent testing agency having approval of the local building authorities.

#### 1.07 PROJECT CONDITIONS

- A. Delivery/Storage/Handling: Store and protect doors in accordance with manufacturer's recommendations and "How to Store, Handle, Finish, Install and Maintain Wood Doors" published by the Window and Door Manufacturers Association (WDMA).
  - 1. Store doors flat and off the floor on a level surface in a dry, well-ventilated building. Do not store on edge. Protect doors from dirt, water and abuse.
  - 2. Certain wood species are light sensitive. Protect all doors from exposure to light (artificial or natural) after delivery.
  - 3. Do not subject interior doors to extremes in either heat or humidity. HVAC systems must be operational and balanced, providing a temperature range of 50 to 80 degrees Fahrenheit and 30% to 60% relative humidity.

4. When handling doors, always lift and carry. Do not drag across other doors or surfaces. Handle with clean hands or gloves.
5. Each door will be marked with the opening number.

#### 1.08 GUARANTEE

- A A written guarantee from door manufacturer shall be delivered to the Architect upon completion of the work. The doors shall be guaranteed for the life of the original installation in accordance with N.W.M.A. Standard Door Guarantee. Warranty shall include finishing and hanging.

### PART 2 PRODUCTS

#### 2.01 FLUSH WOOD DOORS

- A Wood flush doors, except full glass doors and label doors, shall be 5-ply, particle board core, flush doors, DPC-1 by Marshfield Doorsystems Inc. or Novodoor by Algoma. PC-7 doors will not be accepted. Additional alternate manufacturers must be approved by Architect prior to Bidding and provide product equal to or exceeding specified requirements. Doors shall be stained and finished at the factory and delivered to the project in individual protective packaging. Finish shall be a catalyzed liquid finish complying with AWI Section 1500, to meet or exceed System TR-6
- B Wood flush label doors shall be mineral core, flush doors, DFM Series by Marshfield Doorsystems Inc., or Weldrok Core by Algoma. Additional alternate manufacturers must be approved by Architect prior to Bidding and provide product equal to or exceeding specified requirements. Doors shall be stained and finished at the factory and delivered to the project in individual protective packaging.
- C Veneer:
1. Species: As indicated on drawings. If not indicated provide White Birch.
  2. Cut: As indicated on drawings. If not indicated provide Rotary Cut.
  3. Face Grade: WDMA - |A|. As described in HPVA tables AWI section 1300 and ANSI/HPVA-1-2000.
  4. Faces shall be assembled with Type I waterproof glue.
- D Matching:
1. Each leaf: Book Match
  2. Leaves of each Pair: Book Match
  3. Set Match all set of pairs separated by less than 12" between frames.
  4. Assembly of spliced veneer on face shall be Running Match.
  5. The number of flitch sheets used, per door, shall not vary by more than two (2) for any two doors in the building separated by less than forty (40) feet and shall never exceed six (6) per door.
- E Door louvers, where required on the Architectural or Mechanical plans, shall be manufacturer's standard Flat-Slat, louvers in wood species to match door veneer and sized per the Architectural Drawings.
1. Position high side of louver toward privacy (occupant) side of door.
- F Openings for glazed panels shall be cut at the factory and provided with wood beads to support glass. Vision panels in fire rated wood doors shall have wood veneered noncombustible beads to support glass. Doors are to be factory-glazed.
- G Door grills shall be Anemostat Inverted V Louvers with double flange #CHDL-2F 20 gauge, prime painted. Size shall be as indicated on the Mechanical Drawings.
- H Doors shall meet and bear UL labels as called for in the Door Finish Schedule.
- #### 2.02 DOOR FABRICATION
- A. Factory Pre-fit and Bevel Doors 3° bevel or bevel to suit frame sizes indicated, with 1/4" prefit in width, + 0"/- 1/32", tolerances. Prefit top of door 1/8" +1/16"/-0", and undercut as designated by floor condition. For

fire-rated doors comply with NFPA 80 for pre-fitting and undercutting. Pairs to be 1/8" +1/16"/-0" between leaves.

- B. Factory Pre-Machine Doors for Hardware that is not surface applied.
1. Locations and function hole patterns to comply with specified hardware manufacturers template and requirements of NFPA 80 if it applies.
  2. Factory pre-drill all hinge screw pilot holes.
  3. Comply with door manufacturer's requirements to maintain full warranty.
  4. Specific locations for hardware will be coordinated between frame and door manufacturer. Location of hardware will be placed to assure the door warranty is not voided. Manufacture defined light-lock conflicts are to be followed to maintain both Warranty and Fire Label requirements.
  5. Specific hardware preps will be per hardware schedule(s) provided unless in conflict with Warranty or Fire Label. Hardware preps to be neatly and cleanly squared as required per hardware templates.
  6. Pre machine all metal astragals and metal channels to be supplied when required by the fire label. re fire-ratings will not allow metal-free edge(s).

### 2.03 FACTORY FINISHING

- A. Doors to be factory finished to meet or exceed WDMA I.S. 1A TR-6.
1. Stain: As scheduled on drawings. If not scheduled on drawings, color to be selected from Manufacturer's standard selection.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Examine installed door frames prior to hanging door: Verify that frames comply with indicated requirements for type, size, location, and swing and have been installed with plumb jambs and level heads.
- B. Reject doors with defects.
- C. Do not proceed with installation until unsatisfactory conditions have been corrected.
- D. Install wood doors to comply with manufacturer's instructions and referenced quality standard
- E. Install fire-rated doors in corresponding fire-rated frames according to the requirements of NFPA 80.
- F. Job-fit Doors: Align and fit doors in frames with uniform clearances and bevels indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
- G. Fitting Clearances for Non-Fire-Rated Doors: Provide 1/8 inch at jambs and heads, 1/16 inch per leaf at meeting stiles for pairs of doors, and 1/8 inch from bottom of door to top of floor finish or covering. Where threshold is shown or is scheduled, provide 1/4 inch clearance from bottom of door to top of threshold. Provide 3/4 inch clearance from bottom of door to top of floor finish or covering at doors noted on Mechanical Drawings to be undercut.
- H. Fitting Clearances for Fire-Rated-Doors: Comply with NFPA 80.

### 3.02 ADJUSTING, CLEANING, AND PROTECTION

- A. Operation: Rehang or replace doors that do not swing or operate freely. Adjust as necessary to accommodate operating hardware.
- B. Finished Doors: Refinish or replace doors damaged during installation

- C      Protection: Protect doors as recommended by door manufacturer to ensure that wood doors will be without damage or deterioration at the time of Substantial Completion including keeping door protective covering in place until just before Substantial Completion.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A Ceiling and wall access doors.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 SUBMITTALS

- A Submit shop drawings in accordance with Section 01 30 00.

1.04 WARRANTY

- A Provide Manufacturer's Standard Warranty.

PART 2 PRODUCTS

2.01 WALL ACCESS DOORS (NON-RATED)

A. Approved Manufacturers:

1. J.L. Industries; WB Series. (800-554-6077)
2. Karp Associates, Inc.; Type RDW (800-888-4212)
3. Nystrom Building Products; Model NW Series (800-547-2635)
4. Milcor, Inc.; Style DW (800-528-1411)

B. Performance Criteria:

1. Door Size: Select from manufacturer's standard sizes to suit required opening.
2. Designed for flush installation in wall construction. Construct of metal with concealed continuous hinge, having recessed screwdriver latch, size as indicated.

2.02 WALL ACCESS DOORS (FIRE RATED)

A. Approved Manufacturers:

1. J.L. Industries; FDWB Series (800-554-6077)
2. Karp Associates, Inc.; Type KRP-450 FR (800-888-4212)
3. Nystrom Building Products; IW Model Series (800-547-2635)

B. Performance Criteria:

1. Door Size: Select from manufacturer's standard sizes to suit required opening.
2. Fire Rating: 1 hour labeled or as required to match partition into which it is installed.

2.03 CEILING ACCESS DOORS (Non Rated)

A. Approved Manufacturers/Products:

1. Karp Associates, Inc.; Model KDW (800-888-4212)
2. Milcor, Inc.; Style DW (800-528-1411)
3. Williams Brothers Corporation of America; Model WB-DW (800-255-5515)
4. J.L. Industries; WB Series (800-554-6077)
5. Nystrom Building Products; NW Series (800-447-2635)

B. Performance Criteria:

1. Door Size: Select from manufacturer's standard sizes to suit required opening.
2. Sheet metal construction with concealed continuous hinge, flush design. Provide each door with self-closing mechanism and standard flush design "self-latching" latch.

2.04 CEILING ACCESS DOORS (FIRE RATED)

- A. Approved Manufacturers:
  - 1. "Model KRP-350FR"; Karp Associates, Inc. (800-888-4212)
  - 2. "Model WB-FRC"; Williams Brothers Corporation of America (800-255-3515)
  - 3. "FDWB Series"; J.L. Industries (800-554-6077)
  - 4. "IW Series"; Nystrom Building Products (800-447-2635)
- B. Performance Criteria:
  - 1. Door Size: Select from manufacturer's standard sizes to suit required opening.
  - 2. Fire Rating: 1 hour labeled or as required to match assembly into which it is installed.
  - 3. Sheet metal construction with concealed continuous hinge, flush design. Provide each door with self-closing mechanism and standard flush design "self-latching" latch.

2.05 FLOOR/CEILING SYSTEM ACCESS DOORS (FIRE RATED)

- A. Approved Manufacturers:
  - 1. "Model 3210"; Milcor, Inc. (800-528-1411)
  - 2. Approved substitution by J.L. Industries (800-554-6077)
  - 3. Approved substitution by Nystrom Building Products (800-447-2635)
  - 4. Approved Substitution by Karp Associates, Inc. (800-888-4212)
- B. Performance Criteria:
  - 1. Size: Select from manufacturer's standard sizes to suit required opening.
  - 2. Fire Rating: 1 hour labeled or as required to match assembly into which it is installed.
  - 3. Sheet metal construction with concealed continuous hinge, flush design. Provide each door with self-closing mechanism and standard flush design "self-latching" latch.
  - 4. Finish: Bonderized galvanized steel.

2.06 SPRINKLER SYSTEM ACCESS DOORS (FIRE RATED)

- A. Approved Manufacturers:
  - 1. Milcor, Inc. (800-528-1411)
  - 2. Karp Associates, Inc. (718-784-2105)
  - 3. Williams Brothers Corporation of America (309-796-2371)
- B. Performance Criteria:
  - 1. UL B (1-1/2 hr.) rated with automatic closer, UL rated anchors for construction in which door will be installed, and lockset with knob released keyed as directed by Owner.

2.07 EXTERIOR SOFFIT ACCESS DOORS

- A. Approved Manufacturers:
  - 1. "Model DSC-214M"; J.L. Industries (800-888-4212)
  - 2. "CAD-FL Series", www.milfab.com, (800-465-2736)
  - 3. "Model PMS"; Nystrom Building Products (516-294-1801)
- B. Options: Provide key operated cylinder lock and door gasket.
- C. Door Size: Select from manufacturer's standard sizes to suit required opening. Provide 24" x 36" opening where passage through access door is required.

PART 3 EXECUTION

3.01 GENERAL

- A. Verify rough openings for door and frame are correctly sized and located.

- B. Beginning of installation means acceptance of existing conditions.

### 3.02 INSTALLATION

- A. Install units and their accessories in accordance with final Shop Drawings, manufacturer's data, and as herein specified.
- B. Install frame plumb and level in wall and ceiling openings. Position to provide convenient access to concealed work requiring access. Secure rigidly in place.

### 3.03 ADJUSTMENT

- A. Check and readjust operating finish hardware items in work just prior to final inspection.
- B. Remove and replace defective work including doors or frames which are warped, bowed, or otherwise damaged.

### 3.04 TOUCH-UP

- A. Immediately after erection of work, sand smooth any rusted or damaged areas of prime coat and touch-up of compatible air drying primer.

### 3.05 PROTECTION

- A. Protect doors and frames from damage during transportation and at the job site; store at the site under cover on wood blocking or on suitable floors. After installation, protect doors and frames from damage during subsequent construction activities. Damaged work will be rejected and shall be replaced with new work. Factory enameled finished work shall be shipped in cartons or other suitable containers.

### 3.06 CLEANING

- A. Upon completion, metal surfaces of doors and frames that are completely factory finished shall be thoroughly cleaned and touched-up as recommended by the door manufacturer.

END OF SECTION



PART 1 GENERAL

1.01 SCOPE

- A Furnish and install Roll-Up-Service Doors, where shown on the drawings, complete with integral frame, sill, hardware, anchors, electric operators, remote controls, and all other necessary accessories required for full, operable door assembly.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 SUBMITTALS

- A Submit shop drawings to the Architect for approval.

PART 2 PRODUCTS

2.01 MATERIALS

- A Roll-Up-Door shall be of the size shown on the drawings and as manufactured by Overhead Door Corporation, Dallas, Texas, or approved equal.
- B Insulated doors shall be #625 series with Model RDB Electric Operator with Chain Hoist Backup composed of the following features;
1. Double interlocking F-265 slats flat crown, pitch 2-5/8", 20 gauge with 2.2 lb. Density foamed-in-place polyurethane insulation. galvanized with baked enamel primer.
  2. Provide malleable iron end blocks at every alternate slat.
  3. Provide wind-blocks as necessary to meet design wind load (min. 20 psf.)
  4. Hood with baffle
  5. Counterbalance will be helical torsion spring housed in a steel pipe and adjustable by means of external tension wheel.
  6. Guides shall be fabricated of structural steel angles in accordance with "E" guides for steel jambs.
  7. Brackets shall be steel plate to support the barrel, counterbalance, and hood.
  8. Provide total side weather-stripping and bottom bar of two steel angles 2" x 1-1/2" x 3/16" minimum with PVC loop weather-seal.
  9. Motor operator to be 1/2 or 1 hp – 115/230V and 1/2, 1, and 2hp – 208/230/460 three-phase available. Heavy duty, gear reduced, commercial operator designed for use on rolling doors to 860 sq. ft. instant reversing with automatic reset thermal overload. Control circuit is a 24V three-button "Open-Close-Stop" constant contact station. Headplate and wall mount door drive is by chain and sprockets.
  10. Power operated Roll-Up Door shall have photo electric entrapment protection that will activate a switch that will stop and reverse the door's downward travel.
  11. All non-galvanized ferrous surfaces shall receive at least one coat of rust inhibitive primer.
  12. Lacking shall be lay interior side slide bolt lock for electric operations with operator interlock switch.
- C Non-insulated doors shall be #610 series with Model RDB Electric Operator with Chain Hoist Backup composed of the following features;
1. Double interlocking F-265 slats flat crown, pitch 2-5/8", 20 galvanized with baked enamel primer.
  2. Provide malleable iron end blocks at every alternate slat.
  3. Hood with baffle galvanized and primed.
  4. Counterbalance will be helical torsion spring housed in a steel pipe and adjustable by means of external tension wheel.
  5. Guides shall be fabricated of structural steel angles in accordance with "E" guides for steel jambs.
  6. Brackets shall be steel plate to support the barrel, counterbalance, and hood.

7. Motor operator to be ½ or 1 hp – 115/230V and ½, 1, and 2hp – 208/230/460 three-phase available. Heavy duty, gear reduced, commercial operator designed for use on rolling doors to 860 sq. ft. Instant reversing with automatic reset thermal overload. Control circuit is a 24V three-button “Open-Close-Stop” constant contact station. Headplate and wall mount door drive is by chain and sprockets.
  8. Power operated Roll-Up Door shall have photo electric entrapment protection that will activate a switch that will stop and reverse the door’s downward travel.
  9. All non-galvanized ferrous surfaces shall receive at least one coat of rust inhibitive primer.
  10. Locking shall be by interior side slide bolt lock for electric operation with operator interlock switch.
- D Fire-rated doors shall be #634 series with Model RDB Electric Operator with Chain Hoist Backup composed of the following features;
1. Double interlocking F-265 slats flat crown, pitch 2-5/8”, 20 gauge galvanized with baked enamel primer.
  2. Provide malleable iron end blocks at every alternate slat.
  3. Provide wind-blocks as necessary to meet design wind load (min. 20 psf.)
  4. Hood with baffle
  5. Counterbalance will be helical torsion spring housed in a steel pipe and adjustable by means of external tension wheel.
  6. Guides shall be fabricated of structural steel angles in accordance with “E” guides for steel jambs.
  7. Brackets shall be steel plate to support the barrel, counterbalance, and hood.
  8. Motor operator to be ½ or 1 hp – 115/230V and ½, 1, and 2hp – 208/230/460 three-phase available. Heavy duty, gear reduced, commercial operator designed for use on rolling doors to 860 sq. ft. Instant reversing with automatic reset thermal overload. Control circuit is a 24V three-button “Open-Close-Stop” constant contact station. Headplate and wall mount door drive is by chain and sprockets.
  9. Power operated Roll-Up Door shall have photo electric entrapment protection that will activate a switch that will stop and reverse the door’s downward travel.
  10. All non-galvanized ferrous surfaces shall receive at least one coat of rust inhibitive primer.
  11. Automatic closure will be thermally controlled by means of fusible links melting at 165 degrees; operation mechanism will be disengaged during automatic closing. Automatic closing will have a rate of descent controlled by a governor.
  12. Door(s) to have the UL 4-hour label or certificate of inspection.
  13. Bottom bar, Double Steel Angle 2” x 1 ½” x 7/16” min.

### PART 3 EXECUTION

#### 3.01 GENERAL

- A Install overhead doors in accordance with manufacturer’s recommendations and as shown on the drawings.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

- A Furnish and install Roll-Up-Security Grills, where shown on the drawings, complete with integral frame, sill, hardware, anchors, and all other necessary accessories required for full, operable grill assembly.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 SUBMITTALS

- A Submit shop drawings to the Architect for approval prior to fabrication. Include detailed plans, elevations, details of framing members, required clearances, anchors and accessories. Include relationship with other materials.
- B Submit manufacturer's product data and installation instructions for each type of rolling security grill, include both published data and any specific data prepared for this project.

1.04 QUALITY ASSURANCE

- A Manufacturer: Rolling security grills shall be manufactured by a firm with a minimum of five years experience in the fabrication and installation of rolling security grills. Manufacturer's proposed for use, which are not named in these specifications shall submit evidence of ability to meet performance and fabrication requirements specified, and include a list of five projects of similar design and complexity completed within the last five years.
- B Installer: Installation of rolling security grills shall be performed by an authorized representative of the manufacturer.
- C Single-Source Responsibility: Provide security grills, guides, and related primary components from one manufacturer for each type of security grill. Provide secondary components from source acceptable to manufacturer of primary components.

1.05 DELIVERY, STORAGE, AND HANDLING

- A Deliver materials and products in labeled protective packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage from weather, excessive temperatures, and construction operations.

PART 2 PRODUCTS

2.01 MATERIALS

- A Basis of Design:
1. E Series Grille Panel Door by Alpine Overhead Doors, Inc.; [www.alpinedoors.com](http://www.alpinedoors.com).
- B Operation: Push up.
- C Curtain: Horizontal rods with network of vertically interlocking links to form a pattern.
1. Vertical Rod Spacing: 2 inches on center.
  2. Horizontal Link Spacing: 6 inches on center.
  3. Pattern: Straight.
- D Finish: Components shall have the following finish. All non-galvanized, exposed ferrous surfaces shall receive one coat of rust-inhibitive primer.

- E Guides: Extruded aluminum shapes with retainer grooves with continuous silicone treated wool-pile strips or PVC inserts to reduce noise and assist operation.
- F Brackets shall be steel plate to support the barrel, counterbalance, and hood.
- G Counterbalance shall be helical torsion springs housed in a steel pipe barrel, supporting the curtain with a deflection limited to .03" per foot of width.
- H Hood: 24 gauge galvanized primed steel. Provide one intermediate support bracket for wall openings over 13'-6".

### PART 3 EXECUTION

#### 3.01 PREPARATION

- A Take field dimensions and examine conditions of substrates, supports, and other conditions under which this work is expected to be performed. Do not proceed with work until unsatisfactory conditions are corrected.

#### 3.02 INSTALLATION

- A Strictly comply with manufacturer's installation instructions and recommendations. Coordinate installation with adjacent work to ensure proper clearance and allow for maintenance.
- B Install rolling security grills in compliance with requirements of NFPA 80. Test fire-release system and reset components after testing.
- C Instruct Owner's personnel in proper operating procedures and maintenance schedule.

#### 3.03 ADJUSTING AND CLEANING

- A Test rolling security grills for proper operation and adjust as necessary to provide proper operation without binding or distortion.
- B Touch-up damaged coatings and finishes and repair minor damage. Clean exposed surfaces using non-abrasive materials and methods recommended by manufacturer of material or product being cleaned.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum and glass doors.
- B. Pivoting door hardware.
- C. Thermally broken aluminum framing.

1.02 GENERAL

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.
  - 1. Section 08 71 00 - Door Hardware
  - 2. Section 08 80 00 - Glazing
  - 3. Section 08 88 53 – Security Glazing.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's product specifications, technical product data, standard details, and installation recommendations for each type of entrance and storefront product required. Include the following information:
  - 1. Fabrication methods
  - 2. Finishing
  - 3. Hardware
  - 4. Accessories
- B. Shop Drawings: Submit shop drawings for fabrication and installation of entrances and storefronts, including the following:
  - 1. Elevations
  - 2. Detail sections of typical composite members.
  - 3. Hardware, mounting heights
  - 4. Anchorages and reinforcements
  - 5. Expansion provisions
  - 6. Glazing details
- C. Certification: Provide certified test results showing that entrance and storefront systems have been tested by a recognized testing laboratory or agency and comply with specified performance characteristics.

1.04 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Entrances and storefront shall be installed by a firm that has not less than 5 years successful experience in the installation of systems similar to those required.
- B. Installer's Qualifications: Entrances and storefront shall be installed by a firm that has not less than 5 years successful experience in the installation of systems similar to those required.
- C. Design Criteria: Drawings are based on one manufacturer's entrance and storefront system. Another manufacturer's system of a similar and equivalent nature will be acceptable when, in the Architect's sole judgment, differences do not materially detract from the design concept or intended performance.

1.05 PROJECT CONDITIONS

- A. Field Measurements: Check openings by field measurement before fabrication to ensure proper fitting of work; show measurements on final shop drawings. Coordinate fabrications schedule with construction progress to avoid delay in the work. Where necessary, proceed with fabrication without field measurements, and coordinate fabrication tolerances to ensure proper fit.

1.06 WARRANTY

- A. Warranty period for aluminum entrances and storefront is 3 years after the date of substantial completion.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

- A. Performance Requirements: Provide aluminum entrance and storefront assemblies that comply with specified performance characteristics. Each system shall be tested by a recognized testing laboratory or agency in accordance with specified test methods. Provide certified test results.
- B. Thermal Movement: Provide systems capable of withstanding thermal movements resulting from an ambient temperature range of 120° F (67° C), that could cause a metal surface temperature range of 180° F (100° C) within the framing system.
- C. Wind Loading: Provide assemblies capable of withstanding a uniform test pressure of 20 psf inward and 20 psf outward when tested in accordance with ASTM E 330.
- D. Fixed Framing Transmission Characteristics: Provide aluminum entrance and storefront framing system that complies with requirements indicated for transmission characteristics.
- E. Air Infiltration: Provide framing system with an air infiltration rate of not more than 0.06 CFM per sq. ft. of fixed area (excluding operable door edges) when tested in accordance with ASTM E 283 at an inward test pressure differential of 6.24 psf.
- F. Water Penetration: Provide framing systems with no water penetration (excluding operable door edges) as defined in the test method when tested in accordance with ASTM E 331 at an inward test pressure differential of 6.24 lbf. per sq. ft.
- G. Aluminum Entrance Transmission Characteristics: Provide entrance doors with jamb and head frames that comply with requirements indicated for transmission characteristics.
- H. Air Infiltration: Provide doors with an air infiltration rate of not more than 0.50 CFM for single doors and 1.0 for pairs of doors when tested in accordance with ASTM E 283 at an inward test pressure differential of 1.567 psf.

2.02 STOREFRONT/ENTRANCE MANUFACTURERS

- A. Provide complete system meeting the specified requirements as manufactured by one of the following approved manufacturers:
1. Basis of Design: Kawneer Company, Inc.
  2. Substitutions: See Section 01 25 00 – Substitution Procedures.

2.03 MATERIALS

- A. Storefront/Entrance Members: Provide aluminum alloy 6063-T5 with ASTM B 221 for extrusions and ASTM B 209 for sheet or plate. Wall thickness of all door sections, except glazing beads, shall be .125" minimum. Wall thickness of frame members, except glazing beads and glazing pockets, shall be .125" minimum.
- B. Fasteners: Provide fasteners of aluminum, nonmagnetic stainless steel, or other materials warranted by the manufacturer to be non-corrosive and compatible with aluminum components, hardware, anchors and other components.
- C. Reinforcement: Where fasteners crew-anchor into aluminum less than 0.125" thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard non-corrosive pressed-in splined grommet nuts.

- D. Exposed Fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For the application of hardware, use fasteners that match the finish of member or hardware being fastened.
- E. Provide Phillips flat-head machine screws for exposed fasteners.
- F. Concealed Flashing: Provide 26 gauge minimum dead-soft stainless steel, or 0.026" minimum extruded aluminum of alloy and type selected by manufacturer for compatibility with other components.
- G. Brackets and Reinforcements: Where feasible, provide high-strength aluminum brackets and reinforcements; otherwise provide nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.
- H. Concrete/Masonry Inserts: Provide concrete and masonry inserts fabricated from cast-iron, malleable iron, or hot-dip galvanized steel complying with ASTM A 386.
- I. Compression Weatherstripping: Provide the manufacturer's standard replaceable compressible weatherstripping gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287.
- J. Thermal Break with a 1/4" (6.4 mm) separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections. Thermal Break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.
- K. Glass and Glazing Materials: Glass and glazing materials shall comply with requirements of Glazing section of these specifications.

#### 2.04 COMPONENTS

- A. Storefront Framing System: Provide inside-outside matched resilient flush-glazed storefront framing system equal to Trifab VG 451T as manufactured by Kawneer for 1" glazing. Frames and side lights shall be accurately joined at corners with unexposed screws in extruded splines, which are an integral part of all horizontal members. All glazing shall be flush, including the horizontal muntins and sills. Glass shall be held in place by a glazing vinyl on both sides of glass for puttyless glazing. An expansion mullion shall be provided for every 30 lineal feet of continuous frames.
- B. Aluminum Door Frames: Fabricate tubular and channel frame assemblies, as indicated, with welded or mechanical joints in accordance with manufacturer's standards; reinforce as necessary to support required loads.
- C. Stile and Rail Type Aluminum Doors:
  - 1. Frame: Provide tubular frame members, fabricated with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods or j-bolts.
  - 2. Design: Provide 1-3/4" thick, medium Stile doors equal to #400 Medium Stile Mid Panel Panic door as manufactured by U.S. Aluminum. Bottom rail shall be 10".

#### 2.05 FINISHES

- A. High-Performance Organic Finish (2-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.
  - 1. Color: Blue as noted on drawings.

2.06 STOREFRONT ENTRANCE HARDWARE

- A. General: Refer to hardware section in Division 8 for requirements for hardware items indicated to be provided by the Finish Hardware supplier.
- B. Provide manufacturer's Type 10 heavy-duty hardware units as indicated, scheduled, or required for operation of each door, including the following items of sizes, number, and type recommended by manufacturer for service required; finish to match door.
- C. Offset Pivots: ANSI/BHMA A156.4, Grade 1 with exposed parts of cast aluminum alloy. Provide top, bottom, and intermediate pivots at each door leaf.
- D. Butt Hinges: BHMA A156.1, Grade 1, radius corner.
  - 1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
  - 2. Exterior Hinges: Stainless steel, with stainless-steel pin
  - 3. Quantities:
    - a. For doors up to **87 inches (2210 mm)** high, provide 3 hinges per leaf.
    - b. For doors more than **87 and up to 120 inches (2210 and up to 3048 mm)** high, provide 4 hinges per leaf.
- E. Surface-Mounted Overhead Closers: Provide surface-mounted overhead closers; modern type with cover, for hinge side installation; comply with ANSI A156.4, Grade 1. Comply with manufacturer's recommendations for size of closer, depending on door size, exposure to weather and anticipated frequency of use.
- F. Door Stop - Provide floor or wall mounted door stop, as appropriate, with integral rubber bumper; comply with ANSI A156.16, Grade 1.
- G. Deadlocks: Provide mortised maximum security type deadlocks, with minimum 1" long pivoted bolt and stainless steel strike box; comply with ANSI A156.5, Grade 1.
- H. Push/Pull Handles: Provide No. PR032 pull and No. PR031 push set in US26D Satin Chrome finish.
- I. Thresholds: Provide extruded aluminum panic threshold with compressible bulb weatherstrip similar to National Guard 896 V of size required in mill finish, complete with anchors and clips, coordinated with pivots and floor-concealed closers.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine surfaces of openings and verify dimensions; verify rough openings are level, plumb, and square, with no unevenness, bowing, or bumps on floor.
- B. Installation of units constitutes acceptance of existing conditions.

3.02 FABRICATION

- A. General: Sizes of door and frame units and profile requirements are indicated on drawings. Variable dimensions are indicated, with maximum and minimum dimensions required to achieve design requirements and coordination with other work.
- B. Prefabrication: Before shipment to the project site, complete fabrication, assembly, finishing, hardware application, and other work to the greatest extent possible. Disassemble components only as necessary for shipment and installation.
- C. Preglaze door and frame units to greatest extent possible.

- D. Do not drill and tap for surface-mounted hardware items until time of installation at project site.
- E. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work to prevent damage to exposed finish surfaces. For hardware, perform these operations prior to application of finishes.
- F. Welding: Comply with AWS Recommendations; grind exposed welds smooth and restore mechanical finish.
- G. Reinforcing: Install reinforcing as required for hardware and necessary for performance requirements, sag resistance and rigidity.
- H. Dissimilar Metals: Separate dissimilar metals with zinc chromate primer, bituminous paint, or other separator that will prevent corrosion.
- I. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.
- J. Uniformity of Finish: Abutting extrude aluminum members shall not have an integral color or texture variation greater than half the range indicated in the sample pair submittal.
- K. Fasteners: Conceal fasteners wherever possible.
- L. Weatherstripping: For exterior doors, provide compression weatherstripping against fixed stops.
- M. Provide EPDM or vinyl blade gasket weatherstripping in bottom door rail, adjustable for contact with threshold.
- N. At interior doors and other locations without weatherstripping, provide neoprene silencers on stops to prevent metal-to-metal contact.

### 3.03 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations for installation.
- B. Set units plumb, level, and true to line, without warp or rack of framing members, doors, or panels. Provide proper support and anchor securely in place.
- C. Separate aluminum and other corrodible metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials. Comply with requirements specified under paragraph "Dissimilar Materials" in the Appendix to AAMA 101-85.
- D. Drill and tap frames and doors and apply surface-mounted hardware items. Comply with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.
- E. Set sill members and other members in bed of sealant as indicated, or with joint fillers or gaskets as indicated to provide weathertight construction. Comply with requirements of Division 7 for sealants, fillers, and gaskets.
- F. Refer to Section 08 80 00 - Glazing for installation of glass and other panels indicated to be glazed into doors and framing, and not preglazed by manufacturer.
- G. Where required by the details, provide column covers of 0.040" aluminum finished to match storefront material. Provide profiles as detailed.
- H. Continuous along the bottom of all openings provide 0.040" aluminum field flashing.
- I. If necessary, provide drain connections from lower track.

3.04 ADJUSTING

- A. Adjusting operating hardware to function properly for smooth operation without binding, and for weathertight closure.

3.05 CLEANING

- A. Clean the complete system, inside and out, upon completion of construction, exercising care to avoid damage to coatings.
- B. Clean glass surfaces after installation, complying with requirements contained in the "Glass and Glazing" section for cleaning and maintenance. Remove excess glazing and sealant compounds, dirt and other substances from aluminum surfaces.

3.06 PROTECTION

- A. Institute protective measures required throughout the remainder of the construction period to ensure that aluminum entrances and storefronts will be without damage or deterioration, other than normal weathering, at time of acceptance.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

- A. Furnish all labor, material, equipment, and supervision to provide and install aluminum windows in aluminum storefront assemblies in exterior walls.

1.02 GENERAL

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.
1. Section 07 92 00 – Joint Sealants.
  2. Section 08 88 53 – Security Glazing.
  3. Section 09 91 00 – Painting.

Note: Windows and storefront system shall be installed by the same installer for single source responsibility.

1.03 SUBMITTALS

- A. Product Data for each type of window required, including:
1. Standard construction details and fabrication methods.
  2. Profiles and dimensions of individual components.
  3. Data on hardware, accessories, and finishes.
  4. Recommendations for maintenance and cleaning exterior surfaces.
- B. Shop Drawings for each type of window required showing:
1. Layout and installation details, including anchors.
  2. Typical window unit elevations.
  3. Full-size details of typical and composite members.
  4. Glazing Details
  5. Accessories
- C. Samples for color selection.
- D. Certification: Provide certification by a recognized independent testing laboratory or agency certifying that each required type and grade of window complies with performance requirements indicated.

1.04 QUALITY ASSURANCE

- A. Standards: Performance requirements for structural performance, air infiltration, and water penetration for windows are those specified in AAMA 101 for type, grade and performance class of window units required.
- B. Testing: Manufacturer's stock units of each grade of required window shall have been tested by a recognized testing laboratory or agency in accordance with ASTM E 283 for air infiltration, ASTM E 547 for water penetration, and ASTM E 330 for structural performance.
- C. Performance Requirements: Each required window unit shall comply with the following performance requirements.
1. Air Infiltration: Not more than 0.5 cfm per ft. of operable sash joint for an inward test pressure of 1.57 lbf per sq. ft.
  2. Water Penetration: At a static pressure of 8.25 pounds per square foot no water penetration as defined in the test method at an inward test pressure of pressure.
  3. Structural Performance: No glass breakage, damage to hardware, or residual deflection greater than 0.4 percent of the span at a positive (inward) and negative (outward) test pressure of 75 lbf per sq. ft.

- D. Insulating Glass Certification Program: Provide insulating glass units permanently marked with the appropriate certification label of either the Insulating Glass Certification Council (IGCC) or the Associated Laboratories, Inc. (ALI). Provide the certification label either on spacers or at least one component pane of each unit.
- E. Single Source Responsibility: Provide windows produced by a single fabricator who is capable of indicating prior successful production of units similar to those required.

#### 1.05 DESIGN CONCEPT

- A. The drawings indicate window sizes, profiles, and dimensional requirements and are based on the specific types and models indicated. Window units by other manufacturers having equal performance characteristics may be considered, provided deviations from indicated dimensions and profiles are minor and do not change the design concept or intended performance as judged by the Architect. The burden of proof for equality is on the proposer.

#### 1.06 PROJECT CONDITIONS

- A. Field Measurements: Check actual window openings by accurate field measurement before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.
- B. Coordinate fabrication and installation of aluminum windows with fabrication and installation of aluminum storefront assemblies to assure compatibility.

#### 1.07 WARRANTIES

- A. Windows: Windows furnished shall be certified as fully warranted against any defects in material or workmanship under normal use and service for a period of one (1) year from date of fabrication.
- B. Finish: The pigmented organic finishes on windows and component parts (such as panning, trim, mullions and the like) shall be certified as complying fully with requirements of AAMA 603 for pigmented organic coating and fully warranted against chipping, peeling, cracking and blistering for a period of ten (10) years from date of installation.
- C. Glass: Glass shall be warranted from visual obstruction due to internal moisture for a period of five (5) years on sealed insulated glass units.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURER

- A. Provide fixed windows by:
  - 1. Peerless Products Inc.
  - 2. Efco Corporation.
  - 3. Traco.
  - 4. YKK.
  - 5. Substitutions: See Section 01 25 00 – Substitution Procedures.

#### 2.02 MATERIALS

- A. Windows shall conform to all ANSI/AAMA 101-85 H-HC-50 requirements; AASTM E 331 water resistance test; ASTM E 330 uniform load structural test, AAMA 1502.7 Condensation Resistance Test; and the AAMA 1503.1 Thermal Transmittance Test.
- B. Window frames and sash members, including fin trim panning system and retainer legs, shall be of 6063-T5 extruded and heat-treated aluminum. Sweep latches shall be of aluminum or stainless steel. All balances shall be heavy duty Block and tackle type. Balances shall be replaceable. Provision shall be made for the use of half screens. Thermal barrier shall be poured-in-place two part polyurethane. Provide

an extruded aluminum spring catch at the sill of the lower sash. Depth of frame shall be not less than 3-7/8".

- C. Panning system shall include all the fasteners and trim sizes necessary for a complete weather tight and secure installation.
- D. All exposed aluminum shall have thermosetting pigmented organic coating meeting AAMA.603 in color selected by the Architect from the manufacturer's standard colors.
- E. Glass shall be 1" insulated glazing.
- F. Weather-stripping material: Silicone-coated woven pile with polypropylene fin center complying with AAMA 701.

### 2.03 FABRICATION

- A. General: Provide the manufacturer's standard fabrication of units. Comply with indicated standards. Include a complete system for assembly of components and anchorage of window units. Comply with requirements of referenced standards for moisture content of lumber at time of fabrication and for relative humidity conditions in the installation areas.
- B. Fabricate windows to produce units that are reglazable without dismantling sash framing. Provide openings and mortises precut, where possible, to receive hardware and other items.
- C. Each window unit includes sash, frame, stops, sill (including undersill or nosing), exterior casing and moldings, integral mullions and muntins, hardware, and accessories.
- D. Preglazed Window Units: Except for light sizes in excess of 100 united inches, preglaze window units at the shop before delivery, unless preglazing is not available from the fabricator.
- E. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to the project site, to the maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- F. Fabricate window units with an integral concealed low-conductance polyurethane thermal barrier, located between the exterior and the interior of the window, in a manner which eliminates direct metal to metal contact. The thermal break de-bridge spacing must be a minimum of 3/16 inch.

## PART 3 EXECUTION

### 3.01 INSPECTION

- A. Inspect openings before beginning installation. Verify that the opening is correct and the sill plate is level. Do not proceed with installation of window units until unsatisfactory conditions have been corrected.
  - 1. Masonry surfaces shall be visibly dry, and free of excess mortar, sand, and other construction debris.
  - 2. Metal stud frame walls shall be dry, clean, sound and well-attached, free of voids, and without offsets at joints. Ensure that screw heads are driven flush with surfaces in the opening and within 3 inches of the corner.
  - 3. Coordinate window installation with wall flashings and other built-in components.

### 3.02 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations for installation of window units, hardware, accessories, and other window components.
- B. Set units plumb, level, true to line, flush with outer face of adjacent storefront without warp or rack of frames or sash. Provide proper support and anchor securely in place.

- C. Set sill members in a bed of compound or with joint fillers or gaskets as indicated, to provide weathertight construction.

3.03 CLEANING

- A. Clean interior and exterior surfaces promptly after installation. Take care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant, dirt, and other substances.
- B. Clean glass of pre-glazed window units promptly after installation. Wash and polish glass on both faces before Substantial Completion. Comply with manufacturer's recommendations for final cleaning and maintenance. Remove nonpermanent labels from glass surfaces.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded or damaged during the construction period.

3.04 PROTECTION

- A. Protect window units from damage or deterioration until time of substantial completion.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hardware for wood, aluminum, and hollow metal doors.
- B. Hardware for fire-rated doors.
- C. Electrically operated and controlled hardware.
- D. Lock cylinders for doors that hardware is specified in other sections.
- E. Thresholds.
- F. Weatherstripping and gasketing.

1.02 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants: Sealants for setting exterior door thresholds.
- B. Section 08 11 13 - Hollow Metal Doors and Frames.
- C. Section 08 14 16 - Flush Wood Doors.
- D. Section 08 43 13 - Aluminum-Framed Storefronts: Door hardware, except as noted in section.
- E. Section 10 14 00 - Signage: Additional signage requirements.
- F. Section 28 10 00 - Access Control: Electronic access control devices.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. BHMA (CPD) - Certified Products Directory; 2017.
- C. BHMA A156.1 - American National Standard for Butts and Hinges; 2016.
- D. BHMA A156.2 - American National Standard for Bored and Preamsembled Locks & Latches; 2017.
- E. BHMA A156.3 - American National Standard for Exit Devices; 2014.
- F. BHMA A156.4 - American National Standard for Door Controls - Closers; 2013.
- G. BHMA A156.5 - American National Standard for Cylinders and Input Devices for Locks; 2014.
- H. BHMA A156.6 - American National Standard for Architectural Door Trim; 2015.
- I. BHMA A156.7 - American National Standard for Template Hinge Dimensions; 2016.
- J. BHMA A156.8 - American National Standard for Door Controls - Overhead Stops and Holders; 2015.
- K. BHMA A156.12 - American National Standard for Interconnected Locks; 2013.
- L. BHMA A156.13 - American National Standard for Mortise Locks & Latches Series 1000; 2017.
- M. BHMA A156.14 - American National Standard for Sliding and Folding Door Hardware; 2013.
- N. BHMA A156.15 - American National Standard for Release Devices - Closer Holder, Electromagnetic and Electromechanical; 2015.
- O. BHMA A156.16 - American National Standard for Auxiliary Hardware; 2013.
- P. BHMA A156.17 - American National Standard for Self Closing Hinges & Pivots; 2014.
- Q. BHMA A156.18 - American National Standard for Materials and Finishes; 2016.
- R. BHMA A156.21 - American National Standard for Thresholds; 2014.

- S. BHMA A156.22 - American National Standard for Door Gasketing and Edge Seal Systems, Builders Hardware Manufacturers Association; 2017.
- T. BHMA A156.23 - American National Standard for Electromagnetic Locks; 2010.
- U. BHMA A156.24 - American National Standard for Delayed Egress Locking Systems; 2012.
- V. BHMA A156.25 - American National Standard for Electrified Locking Devices; 2013.
- W. BHMA A156.26 - American National Standard for Continuous Hinges; 2012.
- X. BHMA A156.28 - American National Standard for Recommended Practices for Mechanical Keying Systems; 2013.
- Y. BHMA A156.30 - American National Standard for High Security Cylinders; 2014.
- Z. BHMA A156.31 - American National Standard for Electric Strikes and Frame Mounted Actuators; 2013.
- AA. BHMA A156.36 - American National Standard for Auxiliary Locks; 2016.
- AB. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2016.
- AC. BHMA A156.115W - Hardware Preparation in Wood Doors with Wood or Steel Frames; 2006.
- AD. DHI (H&S) - Sequence and Format for the Hardware Schedule; 1996.
- AE. DHI (KSN) - Keying Systems and Nomenclature; 1989.
- AF. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames; 2004.
- AG. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Flush Wood Doors; 1993; also in WDHS-1/WDHS-5 Series, 1996.
- AH. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- AI. ITS (DIR) - Directory of Listed Products; current edition.
- AJ. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- AK. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
- AL. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- AM. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2016.
- AN. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2018.
- AO. UL (DIR) - Online Certifications Directory; Current Edition.
- AP. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- AQ. UL 437 - Standard for Key Locks; Current Edition, Including All Revisions.

#### 1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
- B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
- C. Preinstallation Meeting: Convene a preinstallation meeting one week prior to commencing work of this section; attendance is required by affected installers and the following:
  - 1. MBI Companies.
  - 2. Installer's Architectural Hardware Consultant (AHC).
  - 3. Hardware Installer.
  - 4. Owner's Security Consultant.

- D. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.
- E. Keying Requirements Meeting:
  - 1. MBI Companies will schedule meeting at project site prior to Contractor occupancy.
  - 2. Attendance Required:
    - a. Contractor.
    - b. Owner.
    - c. MBI Companies.
    - d. Installer's Architectural Hardware Consultant (AHC).
    - e. Hardware Installer.
    - f. Owner's Security Consultant.
  - 3. Agenda:
    - a. Establish keying requirements.
    - b. Verify locksets and locking hardware are functionally correct for project requirements.
    - c. Verify that keying and programming complies with project requirements.
    - d. Establish keying submittal schedule and update requirements.
  - 4. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
    - a. Access control requirements.
    - b. Key control system requirements.
    - c. Schematic diagram of preliminary key system.
    - d. Flow of traffic and extent of security required.
  - 5. Record minutes and distribute copies within two days after meeting to participants, with two copies to MBI Companies, Owner, participants, and those affected by decisions made.
  - 6. Deliver established keying requirements to manufacturers.

#### 1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.
- C. Shop Drawings - Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.
  - 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
  - 2. Comply with DHI (H&S) using door numbers and hardware set numbers as indicated in construction documents.
  - 3. List groups and suffixes in proper sequence.
  - 4. Provide complete description for each door listed.
  - 5. Provide manufacturer's and product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.
  - 6. Include account of abbreviations and symbols used in schedule.
- D. Shop Drawings - Electrified Door Hardware: Submit diagrams for power, signal, and control wiring for electrified door hardware that include details of interface with building safety and security systems. Provide elevations and diagrams for each electrified door opening as follows:
  - 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC).
  - 2. Elevations: Submit front and back elevations of each door opening showing electrified devices with connections installed and an operations narrative describing how opening operates from either side at any given time.
  - 3. Diagrams: Submit point-to-point wiring diagram that shows each device in door opening system with related colored wire connections to each device.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

- F. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- G. Keying Schedule:
  - 1. Submit three (3) copies of Keying Schedule in compliance with requirements established during Keying Requirements Meeting unless otherwise indicated.
- H. Manufacturer's Qualification Statement.
- I. Installer's Qualification Statement.
- J. Supplier's Qualification Statement.
- K. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- L. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Lock Cylinders: Ten for each master keyed group.
  - 3. Tools: One set of each special wrench or tool applicable for each different or special hardware component, whether supplied by hardware component manufacturer or not.

#### 1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least five years of documented experience.
- C. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC) to assist in work of this section.

#### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

#### 1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion.
  - 1. Locksets and Cylinders: Three years, minimum.
  - 2. Other Hardware: Two years, minimum.

### PART 2 PRODUCTS

#### 2.01 DESIGN AND PERFORMANCE CRITERIA

- A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.
- B. Provide individual items of single type, of same model, and by same manufacturer.
- C. Provide door hardware products that comply with the following requirements:
  - 1. Applicable provisions of federal, state, and local codes.
  - 2. Accessibility: ADA Standards and ICC A117.1.
  - 3. Applicable provisions of NFPA 101.
  - 4. Fire-Rated Doors: NFPA 80, listed and labeled by qualified testing agency for fire protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
  - 5. Hardware on Fire-Rated Doors: Listed and classified by UL (DIR), ITS (DIR), testing firm acceptable to authorities having jurisdiction, or as suitable for application indicated.
  - 6. Listed and certified compliant with specified standards by BHMA (CPD).

7. Auxiliary Hardware: BHMA A156.16.
8. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
9. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.
10. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified.

D. Electrically Operated and/or Controlled Hardware: Provide necessary power supplies, power transfer hinges, relays, and interfaces as required for proper operation; provide wiring between hardware and control components and to building power connection in compliance with NFPA 70.

1. Refer to Section 28 10 00 for additional access control system requirements.

E. Fasteners:

1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
  - a. Aluminum fasteners are not permitted.
  - b. Provide phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.
2. Provide machine screws for attachment to reinforced hollow metal and aluminum frames.
  - a. Self-drilling (Tek) type screws are not permitted.
3. Provide stainless steel machine screws and lead expansion shields for concrete and masonry substrates.
4. Provide wall grip inserts for hollow wall construction.
5. Provide spacers or sex bolts with sleeves for through bolting of hollow metal doors and frames.
6. Fire-Rated Applications: Comply with NFPA 80.
  - a. Provide wood or machine screws for hinges mortised to doors or frames, strike plates to frames, and closers to doors and frames.
  - b. Provide steel through bolts for attachment of surface mounted closers, hinges, or exit devices to door panels unless proper door blocking is provided.
7. Concealed Fasteners: Do not use through or sex bolt type fasteners on door panel sides indicated as concealed fastener locations, unless otherwise indicated.

## 2.02 HINGES

A. Manufacturers:

1. Basis of Design: Hager Companies.
2. McKinney; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
3. Bommer Industries, Inc: [www.bommer.com](http://www.bommer.com).
4. D&D Technologies USA, Inc; SureClose ConcealFit: [www.ddtech.com](http://www.ddtech.com).
5. Pamex, Inc: [www.pamexinc.com](http://www.pamexinc.com).
6. BEST, dormakaba Group: [www.bestaccess.com/#sle](http://www.bestaccess.com/#sle).
7. Studco Building Systems; EZConcept RocYork Concealed Hinges: [www.studcosystems.com](http://www.studcosystems.com).
8. Waterson Corp; Self-Closing Hinge: [www.watersonusa.com](http://www.watersonusa.com).
9. Substitutions: 01 25 00 - Substitution Procedures.

B. Hinges: Comply with BHMA A156.1, Grade 1.

1. Self Closing Hinges: Comply with BHMA A156.17.
2. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7 for templated hinges.
  - a. Provide hinge width required to clear surrounding trim.
3. Continuous Hinges: Comply with BHMA A156.26.
4. Provide hinges on every swinging door.
5. Provide ball-bearing hinges at each door.
6. Provide non-removable pins on exterior outswinging doors.
7. Provide following quantity of butt hinges for each door:
  - a. Doors From 60 inches High up to 90 inches High: Three hinges.
  - b. Doors 90 inches High up to 120 inches High: Four hinges.
  - c. Doors over 120 inches High: One additional hinge per each additional 30 inches in height.

## 2.03 TRACK AND HANGERS

- A. Manufacturers:
1. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
  2. Hettich America, LP; Grant Folding and Sliding Door Hardware: [www.hettichamerica.com](http://www.hettichamerica.com).
  3. Johnson Hardware: [www.johnsonhardware.com](http://www.johnsonhardware.com).
  4. Knape & Vogt: [www.kv.com](http://www.kv.com).
  5. Studco Building Systems; EZConcept SlideSet: [www.studcosystems.com](http://www.studcosystems.com).
  6. BEST, dormakaba Group: [www.bestaccess.com/#sle](http://www.bestaccess.com/#sle).
  7. Substitutions: 01 25 00 - Substitution Procedures.
- B. Pocket Doors: Provide pocket door kit, including header assembly, split studs, hangers, door hanger plates, bumper, guides, floor plate, and end bracket.
1. Provide flush cup pull on both sides.
  2. Provide edge pull in leading edge.
- C. Sliding and Bifolding Door Hardware: Comply with BHMA A156.14.
1. Provide track, hanger fasteners, guides, and pulls; size track and hangers in accordance with manufacturer's recommendations for weight of doors.
  2. Provide one pull for each pair of panels hinged together.
  3. Provide flush cup pull on each sliding panel.
- D. Face-Mounted Barn Door Hardware:
1. Provide stainless steel, round track rail, track fasteners, guides, latches and pulls; size rail and hangers in accordance with manufacturer's recommendations for weight of doors.
  2. Track Length: 48 inch, nominal.
  3. Track Finish: As selected by Architect.
  4. Hardware Style: As selected by Architect.
- E. Door Weight: Medium; medium frequency of use with 150 to 200 lbs door weight.

## 2.04 FLUSH BOLTS

- A. Manufacturers:
1. Adams Rite, an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  2. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
  3. Ives, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  4. Pamex, Inc: [www.pamexinc.com](http://www.pamexinc.com).
  5. Trimco: [www.trimcohardware.com](http://www.trimcohardware.com).
  6. Substitutions: 01 25 00 - Substitution Procedures.
- B. Flush Bolts: Comply with BHMA A156.16, Grade 1.
1. Flush Bolt Throw: 3/4 inch, minimum.
  2. Provides extension bolts in leading edge of door, one bolt into floor, one bolt into top of frame.
    - a. Pairs of Swing Doors: At inactive leaves, provide flush bolts of type as required to comply with code.
  3. Provide dustproof floor strike for bolt into floor, except at metal thresholds.
  4. Manual Flush Bolts: Provide lever extensions for top bolt at over-sized doors.
  5. Self-Latching Flush Bolts: Automatically latch upon closing of door; manually retracted; located on inactive leaf of pair of doors.
  6. Automatic Flush Bolts: Automatically latch upon closing of door; automatic retraction of bolts when active leaf is opened; located on inactive leaf of pair of doors.

## 2.05 EXIT DEVICES

- A. Manufacturers:
1. Corbin Russwin, Sargent, or Yale; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  2. Detex Corporation; Advantex: [www.detex.com](http://www.detex.com).
  3. DORMA USA, Inc; 9000 Series: [www.dorma.com](http://www.dorma.com).
  4. Hager Companies: [www.hagerco.com](http://www.hagerco.com).

5. Pamex, Inc: [www.pamexinc.com](http://www.pamexinc.com).
6. Precision, dormakaba Group: [www.precisionhardware.com](http://www.precisionhardware.com).
7. Von Duprin, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
8. Substitutions: 01 25 00 - Substitution Procedures.

B. Exit Devices: Comply with BHMA A156.3, Grade 1.

1. Lever design to match lockset trim.
2. Provide cylinder with cylinder dogging or locking trim.
3. Provide exit devices properly sized for door width and height.
4. Provide strike as recommended by manufacturer for application indicated.
5. Provide UL (DIR) listed exit device assemblies for fire-rated doors and panic device assemblies for non-fire-rated doors.
6. For electrical options, provide quick connect plug-in pre-wired connectors.

2.06 ELECTRIC STRIKES

A. Manufacturers:

1. Adams Rite, HES, or Securitron; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
2. Pamex, Inc: [www.pamexinc.com](http://www.pamexinc.com).
3. RCI, dormakaba Group: [www.dormakaba.com](http://www.dormakaba.com)
4. Substitutions: 01 25 00 - Substitution Procedures.

B. Electric Strikes: Comply with BHMA A156.31, Grade 1.

1. Provide UL (DIR) listed burglary-resistant electric strike; style to suit locks.
2. Provide non-handed 24 VDC electric strike suitable for door frame material and scheduled lock configuration.
3. Provide field selectable Fail Safe/Fail Secure modes.
4. Provide transformer and rectifier as necessary for complete installation.
5. Connect electric strikes into fire alarm where non-rated doors are scheduled to release with fire or sprinkler alarm condition.

2.07 ELECTROMAGNETIC LOCKS

A. Manufacturers:

1. Securitron; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
2. RCI, dormakaba Group: [www.dormakaba.com](http://www.dormakaba.com)
3. Substitutions: 01 25 00 - Substitution Procedures.

B. Electromagnetic Locks: Comply with BHMA A156.23, Grade 1.

1. Holding Force: 600 lbs, minimum.
2. Voltage: 12 VDC, and provide power supplies by same manufacturer as locks.
3. Provide electromagnetic locks for fire-rated doors in compliance with UL 10C.
4. Mounting: Surface mounted to door and frame on secure side, with fasteners, brackets, and spacer bars as required for application.
5. Provide concealed sensing device within device that monitors magnetic holding force to ensure appropriate door lock.
6. Provide concealed adjustable time delay option to re-lock door, adjustable from 1 to 90 seconds.

2.08 DELAYED-EGRESS ELECTROMAGNETIC LOCKS

A. Manufacturers:

1. Securitron; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
2. RCI, dormakaba Group: [www.dormakaba.com](http://www.dormakaba.com)
3. Substitutions: 01 25 00 - Substitution Procedures.

B. Delayed-Egress Electromagnetic Locks: Comply with BHMA A156.24, Grade 1.

1. Delayed-Egress Timer: Upon depressing push bar provide 30 seconds delay before door egress permitted, in compliance with NFPA 101.
2. Holding Force: 600 lbs, minimum.
3. Voltage: 12 VDC, and provide power supplies by same manufacturer as locks.

4. Provide electromagnetic locks for fire-rated doors in compliance with UL 10C.
5. Mounting: Surface mounted to door and frame on secure side, with fasteners, brackets, and spacer bars as required for application.
6. Provide concealed sensing device that monitors magnetic holding force to ensure appropriate door lock.

## 2.09 LOCK CYLINDERS

- A. Manufacturers:
1. Best, Dormakaba Group: [www.bestaccess.com](http://www.bestaccess.com).
  2. Substitutions: 01 25 00 - Substitution Procedures.
- B. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
1. Provide standard, electronic, conventional, full size interchangeable core (FSIC), and small format interchangeable core (SFIC) type cylinders, Grade 1, with six-pin core in compliance with BHMA A156.5 at locations indicated.
  2. Provide high security mechanical type cylinders, Grade 1, with six-pin core in compliance with BHMA A156.30 or UL 437 at locations indicated.
  3. Provide cylinders from same manufacturer as locking device.
  4. Provide cams and/or tailpieces as required for locking devices.
  5. Within specific Door Sections, when provisions for lock cylinder are being referenced to this Section, provide specified lock cylinder and keyed to building keying system, unless otherwise indicated.

## 2.10 CYLINDRICAL LOCKS

- A. Manufacturers:
1. Corbin Russwin, Sargent, or Yale; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  2. Best, Dormakaba Group: [www.bestaccess.com](http://www.bestaccess.com).
  3. DORMA USA, Inc; C300 Series, C500 Series, C100 Series, and C200 Series: [www.dorma.com](http://www.dorma.com).
  4. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
  5. Pamex, Inc: [www.pamexinc.com](http://www.pamexinc.com).
  6. Basis of Design: Schlage, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  7. Substitutions: 01 25 00 - Substitution Procedures.
- B. Cylindrical Locks (Bored): Comply with BHMA A156.2, Grade 1, 4000 Series.
1. Bored Hole: 2-1/8 inch diameter.
  2. Latchbolt Throw: 1/2 inch, minimum.
  3. Backset: 2-3/4 inch unless otherwise indicated.
  4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
    - a. Finish: To match lock or latch.
    - b. Flat-Lip Strikes: Provide for locks with three piece antifriction latchbolts as recommended by manufacturer.
    - c. Extra-Long-Lip Strikes: Provide for locks used on frames with applied wood casing trim.
    - d. Aluminum-Frame Strike Box: Provide strike box fabricated for use with aluminum framing by framing manufacturer.
    - e. Rabbet Front and Strike: Provide on locksets for use with rabbeted meeting rails.
  5. Provide a lock for each door, unless otherwise indicated that lock is not required.
  6. Provide an office lockset for swinging door where hardware set is not indicated.
  7. Trim: Provide lever handle or pull trim on outside of each lock, unless otherwise indicated.

## 2.11 MORTISE LOCKS

- A. Manufacturers:
1. Corbin Russwin, Sargent, or Yale; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  2. Best, dormakaba Group: [www.bestaccess.com](http://www.bestaccess.com).
  3. DORMA USA, Inc; M9000 Series: [www.dorma.com](http://www.dorma.com).
  4. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
  5. Schlage, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  6. Substitutions: 01 25 00 - Substitution Procedures.

- B. Mortise Locks: Comply with BHMA A156.13, Grade 1, Security, 1000 Series.
  - 1. Latchbolt Throw: 3/4 inch, minimum.
  - 2. Deadbolt Throw: 1 inch, minimum.
  - 3. Backset: 2-3/4 inch unless otherwise indicated.
  - 4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
    - a. Flat-Lip Strikes: Provide for locks with three piece antifriction latchbolts as recommended by manufacturer.
    - b. Extra-Long-Lip Strikes: Provide for locks used on frames with applied wood casing trim.
    - c. Aluminum-Frame Strike Box: Provide strike box fabricated for use with aluminum framing by framing manufacturer.
    - d. Rabbet Front and Strike: Provide on locksets for use with rabbeted meeting rails.
    - e. Finish: To match lock or latch.

## 2.12 ELECTROMECHANICAL LOCKS

- A. Manufacturers:
  - 1. Sargent or Yale; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. Best, dormakaba Group: [www.bestaccess.com](http://www.bestaccess.com).
  - 3. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
  - 4. Schlage, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  - 5. Substitutions: 01 25 00 - Substitution Procedures.
- B. Electromechanical Locks: Comply with BHMA A156.25, Grade 1.
  - 1. Provide motor-driven or solenoid-driven locks, with strike that is applicable to frame.
  - 2. Type: Mortise deadbolt.

## 2.13 INTERCONNECTED LOCKS

- A. Manufacturers:
  - 1. DORMA USA, Inc; J300 Series: [www.dorma.com](http://www.dorma.com).
  - 2. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
  - 3. Pamex, Inc: [www.pamexinc.com](http://www.pamexinc.com).
  - 4. Schlage, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  - 5. dormakaba Group: [www.dormakaba.com](http://www.dormakaba.com).
  - 6. Substitutions: 01 25 00 - Substitution Procedures.
- B. Interconnected Locks: Comply with BHMA A156.12, Grade 1, 5000 Series.

## 2.14 AUXILIARY LOCKS (DEADLOCKS)

- A. Manufacturers:
  - 1. Yale; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. Best, dormakaba Group: [www.bestaccess.com](http://www.bestaccess.com).
  - 3. DORMA USA, Inc; D800 Series and DB600 Series: [www.dorma.com](http://www.dorma.com).
  - 4. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
  - 5. Pamex, Inc: [www.pamexinc.com](http://www.pamexinc.com).
  - 6. dormakaba Group: [www.dormakaba.com](http://www.dormakaba.com).
  - 7. Substitutions: 01 25 00 - Substitution Procedures.
- B. Auxiliary Locks (Deadlocks): Comply with BHMA A156.36, Grade 1.
  - 1. Type: Bored (cylindrical).
  - 2. Application: Bored.
  - 3. Backset: 2-3/4 inch, unless otherwise indicated.
  - 4. Bolt Throw: 1/2 inch, with latch made of hardened steel.
  - 5. Provide strike that matches frame.

2.15 DOOR PULLS AND PUSH PLATES

- A. Manufacturers:
  - 1. Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. Forms+Surfaces: [www.forms-surfaces.com](http://www.forms-surfaces.com).
  - 3. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
  - 4. Hiawatha, Inc, division of Activar Construction Products Group, Inc: [www.activarcpg.com/hiawatha](http://www.activarcpg.com/hiawatha).
  - 5. Pamex, Inc: [www.pamexinc.com](http://www.pamexinc.com).
  - 6. Trimco: [www.trimcohardware.com](http://www.trimcohardware.com).
  - 7. Substitutions: 01 25 00 - Substitution Procedures.
- B. Door Pulls and Push Plates: Comply with BHMA A156.6.
  - 1. Pull Type: Straight, unless otherwise indicated.
  - 2. Push Plate Type: Flat, with square corners, unless otherwise indicated.
    - a. Edges: Beveled, unless otherwise indicated.
  - 3. Material: Aluminum, unless otherwise indicated.
  - 4. Provide door pulls and push plates on doors without a lockset, latchset, exit device, or auxiliary lock unless otherwise indicated.
  - 5. On solid doors, provide matching door pull and push plate on opposite faces.
  - 6. On glazed storefront doors, provide matching door pulls/push plates on both faces unless otherwise indicated.

2.16 DOOR PULLS AND PUSH BARS

- A. Manufacturers:
  - 1. Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
  - 3. Hiawatha, Inc, division of Activar Construction Products Group, Inc: [www.activarcpg.com/hiawatha](http://www.activarcpg.com/hiawatha).
  - 4. Trimco: [www.trimcohardware.com](http://www.trimcohardware.com).
  - 5. Substitutions: 01 25 00 - Substitution Procedures.
- B. Door Pulls and Push Bars: Comply with BHMA A156.6.
  - 1. Bar Type: Bar set, unless otherwise indicated.
  - 2. Material: Aluminum, unless otherwise indicated.

2.17 COORDINATORS

- A. Manufacturers:
  - 1. Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. DORMA USA, Inc; TS93 GSR: [www.dorma.com](http://www.dorma.com).
  - 3. Hiawatha, Inc, division of Activar Construction Products Group, Inc: [www.activarcpg.com/hiawatha](http://www.activarcpg.com/hiawatha).
  - 4. Ives, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  - 5. Pamex, Inc: [www.pamexinc.com](http://www.pamexinc.com).
  - 6. Trimco: [www.trimcohardware.com](http://www.trimcohardware.com).
  - 7. Substitutions: 01 25 00 - Substitution Procedures.
- B. Coordinators: Provide on doors having closers and self-latching or automatic flush bolts to ensure that inactive door leaf closes before active door leaf.
  - 1. Type: Bar, unless otherwise indicated.
  - 2. Material: Aluminum, unless otherwise indicated.
  - 3. Ensure that coordination of other door hardware affected by placement of coordinators and carry bar is applied properly for completely operable installation.

2.18 CARRY BAR

- A. Manufacturers:
  - 1. Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. Hiawatha, Inc, division of Activar Construction Products Group, Inc: [www.activarcpg.com/hiawatha](http://www.activarcpg.com/hiawatha).
  - 3. Ives, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  - 4. Trimco: [www.trimcohardware.com](http://www.trimcohardware.com).

5. Substitutions: 01 25 00 - Substitution Procedures.

- B. Carry Bar: Provides a push on active door when inactive door is opened first to allow coordinator to be engaged for proper door leaf closing sequence.
  1. Material: Brass with nylon rollers, unless otherwise indicated.

## 2.19 CLOSERS

- A. Manufacturers; Surface Mounted:
  1. Corbin Russwin, Norton, Rixson, Sargent, or Yale; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  2. DORMA USA, Inc; 7400 Series, 8600 Series, 8900 Series, and TS93: [www.dorma.com](http://www.dorma.com).
  3. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
  4. LCN, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  5. Pamex, Inc: [www.pamexinc.com](http://www.pamexinc.com).
  6. Dormakaba Group: [www.dormakaba.com](http://www.dormakaba.com).
  7. Substitutions: 01 25 00 - Substitution Procedures.
- B. Manufacturers; Concealed - Overhead:
  1. DORMA USA, Inc; RTS88: [www.dorma.com](http://www.dorma.com).
  2. Substitutions: 01 25 00 - Substitution Procedures.
- C. Manufacturers; Low Energy for ADA Applications:
  1. Dormakaba Group; ED900 Series: [www.stanleyhardwarefordoors.com/#sle](http://www.stanleyhardwarefordoors.com/#sle).
  2. Substitutions: 01 25 00 - Substitution Procedures.
- D. Closers: Comply with BHMA A156.4, Grade 1.
  1. Type: Surface mounted to door.
  2. Provide door closer on each exterior door.
  3. Provide door closer on each fire-rated and smoke-rated door.
    - a. Spring hinges are not an acceptable self-closing device, unless otherwise indicated.
  4. Where an overlapping astragal is included on pairs of swinging doors, provide coordinator to ensure door leaves close in proper order.
  5. At corridor entry doors, mount closer on room side of door.
  6. At outswinging exterior doors, mount closer on interior side of door.

## 2.20 OVERHEAD STOPS AND HOLDERS

- A. Manufacturers:
  1. Rixson or Sargent; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  2. DORMA USA, Inc; 900 Series: [www.dorma.com](http://www.dorma.com).
  3. Glynn-Johnson, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  4. Pamex, Inc: [www.pamexinc.com](http://www.pamexinc.com).
  5. Substitutions: 01 25 00 - Substitution Procedures.
- B. Overhead Stops and Holders (Door Checks): Comply with BHMA A156.8, Grade 1.
  1. Provide stop for every swinging door, unless otherwise indicated.
  2. Stop is not required if positive stop feature is specified for door closer; positive stop feature of door closer is not an acceptable substitute for a stop, unless otherwise indicated.

## 2.21 PROTECTION PLATES

- A. Manufacturers:
  1. Basis of Design: Hager Companies.
  2. Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  3. Hiawatha, Inc, an Activar Construction Products Group company: [www.activarcpg.com/hiawatha](http://www.activarcpg.com/hiawatha).
  4. Ives, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  5. Pamex, Inc: [www.pamexinc.com](http://www.pamexinc.com).
  6. Trimco: [www.trimcohardware.com](http://www.trimcohardware.com).
  7. Substitutions: 01 25 00 - Substitution Procedures.

- B. Protection Plates: Comply with BHMA A156.6.
- C. Metal Properties: Stainless steel.
  - 1. Metal, Standard Duty: Thickness 0.05 inch, minimum.
- D. Edges: Beveled, on four sides unless otherwise indicated.
- E. Fasteners: Countersunk screw fasteners.
- F. Provide clear anti-microbial coating that is silver ion-based.
- G. Drip Guard: Provide at head of exterior doors unless covered by roof or canopy.

#### 2.22 ARMOR PLATES

- A. Manufacturers:
  - 1. Hiawatha, Inc, an Activar Construction Products Group company: [www.activarcpg.com/hiawatha](http://www.activarcpg.com/hiawatha).
  - 2. Ives, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  - 3. Trimco: [www.trimcohardware.com](http://www.trimcohardware.com).
  - 4. Substitutions: 01 25 00 - Substitution Procedures.
- B. Armor Plates: Provide on bottom half of push side of doors that require protection from objects moving through openings that may damage door surface.
  - 1. Size: 16 inch high by 1-1/2 inch less door width (LDW) on pull side and 2 inch LDW on push side of door.

#### 2.23 KICK PLATES

- A. Manufacturers:
  - 1. Basis of Design: Hager Companies.
  - 2. Hiawatha, Inc, an Activar Construction Products Group company: [www.activarcpg.com/hiawatha](http://www.activarcpg.com/hiawatha).
  - 3. Ives, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  - 4. Trimco: [www.trimcohardware.com](http://www.trimcohardware.com).
  - 5. Substitutions: 01 25 00 - Substitution Procedures.
- B. Kick Plates: Provide along bottom edge of push side of every door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.
  - 1. Size: 8 inch high by 2 inch less door width (LDW) on push side of door.

#### 2.24 MOP PLATES

- A. Manufacturers:
  - 1. Hiawatha, Inc, an Activar Construction Products Group company: [www.activarcpg.com/hiawatha](http://www.activarcpg.com/hiawatha).
  - 2. Ives, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  - 3. Trimco: [www.trimcohardware.com](http://www.trimcohardware.com).
  - 4. Substitutions: 01 25 00 - Substitution Procedures.
- B. Mop Plates: Provide along bottom edge of push side and pull side of doors to provide protection from cleaning liquids and equipment damage to door surface.
  - 1. Size: 6 inch high by 1-1/2 inch less door width (LDW) on pull side and 2 inch LDW on push side of door.

#### 2.25 STRETCHER PLATES

- A. Manufacturers:
  - 1. Ives, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  - 2. Trimco: [www.trimcohardware.com](http://www.trimcohardware.com).
  - 3. Substitutions: 01 25 00 - Substitution Procedures.
- B. Stretcher Plates: Provide along middle of push side and pull side of doors to provide protection from stretcher hitting door and damaging door surface.
  - 1. Size: 6 inch high by 1-1/2 inch less door width (LDW) on pull side and 2 inch LDW on push side of door.

## 2.26 DOOR EDGE PLATES

- A. Manufacturers:
  - 1. Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. Hiawatha, Inc, an Activar Construction Products Group company: [www.activarcpg.com/hiawatha](http://www.activarcpg.com/hiawatha).
  - 3. Ives, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  - 4. Trimco: [www.trimcohardware.com](http://www.trimcohardware.com).
  - 5. Substitutions: 01 25 00 - Substitution Procedures.
- B. Door Edge Plates: Comply with BHMA A156.6.
  - 1. Provide along hanging and latching edge of door to protect from damage as objects are moved through door opening.
  - 2. Material: Stainless steel, at least 0.050 inch thick.
  - 3. Type: Beveled edge, surface mounted onto edge of door.

## 2.27 DOOR HOLDERS

- A. Manufacturers:
  - 1. Basis of Design: Rixson/Firemark.
  - 2. McKinney or Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 3. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
  - 4. Hiawatha, Inc, division of Activar Construction Products Group, Inc: [www.activarcpg.com/hiawatha](http://www.activarcpg.com/hiawatha).
  - 5. Trimco: [www.trimcohardware.com](http://www.trimcohardware.com).
  - 6. Substitutions: 01 25 00 - Substitution Procedures.
- B. Door Holders: Comply with BHMA A156.16, Grade 1.
  - 1. Provide surface mounted door holders when wall or floor stop is not applicable and hold-open device is mounted on door.
  - 2. Type: Angle stop at head of opening.
  - 3. Material: Aluminum.

## 2.28 ELECTROMAGNETIC DOOR HOLDERS

- A. Manufacturers:
  - 1. Rixson or Sargent; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. DORMA USA, Inc; EM Series: [www.dorma.com](http://www.dorma.com).
  - 3. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
  - 4. Substitutions: 01 25 00 - Substitution Procedures.
- B. Electromagnetic Door Holders: Comply with BHMA A156.15.
  - 1. Type: Wall mounted, single unit, standard duty, with strike plate attached to door.
  - 2. Holding Force, Standard Duty: 40 lbs-force, minimum.
  - 3. Voltage: 12 VDC, and provide power supplies by same manufacturer as holders.
  - 4. Fail safe; door released to close automatically when electrical current is interrupted.
  - 5. Provide interface with fire detectors and fire-alarm system for fire-rated door assemblies.

## 2.29 FLOOR STOPS

- A. Manufacturers:
  - 1. Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
  - 3. Hiawatha, Inc, division of Activar Construction Products Group, Inc: [www.activarcpg.com/hiawatha](http://www.activarcpg.com/hiawatha).
  - 4. Trimco: [www.trimcohardware.com](http://www.trimcohardware.com).
  - 5. Substitutions: 01 25 00 - Substitution Procedures.
- B. Floor Stops: Comply with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.
  - 1. Provide floor stops when wall surface is not available; be cautious not to create a tripping hazard.
  - 2. Type: Manual hold-open, with pencil floor stop.
  - 3. Material: Aluminum housing with rubber insert.

2.30 WALL STOPS

- A. Manufacturers:
  - 1. Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
  - 3. Hiawatha, Inc, division of Activar Construction Products Group, Inc: [www.activarcpg.com/hiawatha](http://www.activarcpg.com/hiawatha).
  - 4. Trimco: [www.trimcohardware.com](http://www.trimcohardware.com).
  - 5. Substitutions: 01 25 00 - Substitution Procedures.
- B. Wall Stops: Comply with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.
  - 1. Type: Bumper, concave, wall stop.
  - 2. Material: Aluminum housing with rubber insert.

2.31 ASTRAGALS

- A. Manufacturers:
  - 1. Pemko; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
  - 3. National Guard Products, Inc: [www.ngpinc.com](http://www.ngpinc.com).
  - 4. Reese Enterprises, Inc: [www.reeseusa.com](http://www.reeseusa.com).
  - 5. Zero International, Inc: [www.zerointernational.com](http://www.zerointernational.com).
  - 6. Substitutions: 01 25 00 - Substitution Procedures.
- B. Astragals: Comply with BHMA A156.22.
  - 1. Provide surface mounted astragal to cover or fill space for full door height between pair of doors or door and adjacent jamb.
  - 2. Type: Split, two parts, and with sealing gasket.
  - 3. Material: Aluminum, with neoprene weatherstripping.
  - 4. Provide non-corroding fasteners at exterior locations.

2.32 THRESHOLDS

- A. Manufacturers:
  - 1. Basis of Design: National Guard Products, Inc: [www.ngpinc.com](http://www.ngpinc.com).
  - 2. Pemko; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 3. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
  - 4. Reese Enterprises, Inc: [www.reeseusa.com](http://www.reeseusa.com).
  - 5. Zero International, Inc: [www.zerointernational.com](http://www.zerointernational.com).
  - 6. Substitutions: 01 25 00 - Substitution Procedures.
- B. Thresholds: Comply with BHMA A156.21.
  - 1. Provide threshold at interior doors for transition between two different floor types, and over building expansion joints, unless otherwise indicated.
  - 2. Provide threshold at each exterior door, unless otherwise indicated.
  - 3. Provide threshold with Sound Transmission Class (STC) of 25-30 at locations indicated.
  - 4. Type: Flat surface.
  - 5. Material: Aluminum.
  - 6. Threshold Surface: Fluted horizontal grooves across full width.
  - 7. Field cut threshold to profile of frame and width of door sill for tight fit.
  - 8. Provide non-corroding fasteners at exterior locations.

2.33 WEATHERSTRIPPING AND GASKETING

- A. Manufacturers:
  - 1. Basis of Design: National Guard Products, Inc: [www.ngpinc.com](http://www.ngpinc.com).
  - 2. Pemko; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 3. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
  - 4. Reese Enterprises, Inc: [www.reeseusa.com](http://www.reeseusa.com).

5. Zero International, Inc: [www.zerointernational.com](http://www.zerointernational.com).
6. Substitutions: 01 25 00 - Substitution Procedures.

B. Weatherstripping and Gasketing: Comply with BHMA A156.22.

1. Head and Jamb Type: Adjustable.
2. Door Sweep Type: Encased in retainer.
3. Material: Aluminum, with brush weatherstripping.
4. Provide gasketing for smoke and draft control doors (Indicated as "S" on Drawings) that complies with local codes, requirements of assemblies tested in accordance with UL 1784.
5. Provide frame-applied intumescent gasketing on wood doors that are labeled as smoke and draft control doors (Indicated as "S" on Drawings), unless otherwise indicated.
6. Refer to Section 08 1416 when wood door to frame sealing system is applied by door manufacturer.
7. Provide weatherstripping on each exterior door at head, jambs, and meeting stiles of door pairs, unless otherwise indicated; .
8. Provide door bottom sweep on each exterior door, unless otherwise indicated.
9. Provide sound-rated gasketing and automatic door bottom on doors indicated as "Sound-Rated", "Acoustical", or with "Sound Transmission Class (STC) rating"; fabricate as continuous gasketing, do not cut or notch gasketing material.
10. Provide applicable gasketing on doors indicated as "Lightproof."

2.34 BUMPER GUARD

A. Manufacturers:

1. Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
2. Substitutions: 01 25 00 - Substitution Procedures.

B. Bumper Guard: Provide to protect door surface and operating hardware from being damaged by heavy objects that move through opening.

1. Type: Exit device, surface mounted.
2. Material: Stainless steel.

2.35 CARD HOLDERS

A. Manufacturers:

1. Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
2. Substitutions: 01 25 00 - Substitution Procedures.

B. Card Holders: Provide on outside face of door, used to hold an index card, screw fastened.

C. Material: Brass.

2.36 COAT HOOKS

A. Manufacturers:

1. Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
2. Substitutions: 01 25 00 - Substitution Procedures.

B. Coat Hooks: Provide on room side of door, screw fastened.

C. Material: Brass.

2.37 DECALS

A. Manufacturers:

1. Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
2. Substitutions: 01 25 00 - Substitution Procedures.

B. Decals: Provide to identify certain common phrases required by code and related to door operation.

1. Phrase Required: THIS DOOR TO REMAIN UNLOCKED DURING BUSINESS HOURS.
2. Material: Plastic, adhered.
3. Letter Size and Placement: As required by local codes.

2.38 GATE LATCH

- A. Manufacturers:
  - 1. Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. Substitutions: 01 25 00 - Substitution Procedures.
- B. Gate Latch: Provide to secure a gate used for traffic control to prevent pedestrian traffic into an area, located on inside of gate with turn piece.
  - 1. Material: Brass.

2.39 PADLOCKS

- A. Manufacturers:
  - 1. Best, dormakaba Group: [www.bestaccess.com](http://www.bestaccess.com).
  - 2. Substitutions: 01 25 00 - Substitution Procedures.
- B. Padlocks: Solid extruded brass case with shackle that locks at heel and toe.
  - 1. Shackle Height: 3/4 inch, and width of opening is 7/8 inch.
  - 2. Shackle Diameter: 1/4 inch.

2.40 DOOR GUARD

- A. Manufacturers:
  - 1. Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. Substitutions: 01 25 00 - Substitution Procedures.
- B. Door Guard: Provide as a secondary precaution, typically on dwelling or hotel room entrance doors, that allows a mechanical means to ensure privacy on inside of locked door with protection plate.
  - 1. Material: Aluminum.

2.41 KNOCKERS

- A. Manufacturers:
  - 1. Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. Substitutions: 01 25 00 - Substitution Procedures.
- B. Knockers: Provide both a means of knocking on door without using your hand and an aesthetic appeal to door design.
  - 1. Type: Ornate door knocker.
  - 2. Material: Brass.

2.42 LATCH PROTECTOR

- A. Manufacturers:
  - 1. Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. Substitutions: 01 25 00 - Substitution Procedures.
- B. Latch Protector: Provide on door to protect latch from being tampered with while in locked position.
  - 1. Type: Standard latch protector.
  - 2. Material: Stainless steel.

2.43 LETTERBOX PLATES

- A. Manufacturers:
  - 1. Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. Substitutions: 01 25 00 - Substitution Procedures.
- B. Letterbox Plates (Mail Slot): Provide cutout in face of door used to accept mail inside without opening door, with spring tensioned cover to close opening and applied to both sides of door.
  - 1. Material: Brass.

2.44 MAGNETIC CATCH

- A. Manufacturers:
  - 1. Ives, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  - 2. Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 3. Substitutions: 01 25 00 - Substitution Procedures.
- B. Magnetic Catch: Provide on doors that are not frequently used and need to latch, and on doors that must stay in closed position within the frame.
  - 1. Location: Mount magnetic catch at top of door jamb with strike plate fastened to door.
  - 2. Material: Brass.

2.45 ROLLER LATCH

- A. Manufacturers:
  - 1. Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. Substitutions: 01 25 00 - Substitution Procedures.
- B. Roller Latch: Provide on doors that are not frequently used and need to latch, and on doors that must stay in closed position within the frame.
  - 1. Location: Mount roller latch at top of door with strike plate fastened to head of door frame.
  - 2. Material: Aluminum.

2.46 SIGNAGE

- A. See Section 10 14 00 for additional signage requirements.

2.47 SILENCERS

- A. Manufacturers:
  - 1. Ives, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  - 2. Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 3. Substitutions: 01 25 00 - Substitution Procedures.
- B. Silencers: Provide at equal locations on door frame to mute sound of door's impact upon closing.
  - 1. Single Door: Provide three on strike jamb of frame.
  - 2. Pair of Doors: Provide two on head of frame, one for each door at latch side.
  - 3. Material: Rubber, gray color.

2.48 VERTICAL ROD COVERS

- A. Manufacturers:
  - 1. Rockwood; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. Substitutions: 01 25 00 - Substitution Procedures.
- B. Vertical Rod Covers: Provides protection from damage or tampering of surface mounted bottom vertical rod of exit device and to accommodate ADA Standards.
  - 1. Length: 12 inch.
  - 2. Material: Stainless steel.

2.49 VIEWER

- A. Manufacturers:
  - 1. Ives, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  - 2. Substitutions: 01 25 00 - Substitution Procedures.
- B. Viewer: Provide at inside of door at eye level to see who is on outside of door.
  - 1. Material: Brass.

2.50 WIRELESS ACCESS MANAGEMENT SYSTEMS

- A. Manufacturers:
  - 1. Best, dormakaba Group: [www.bestaccess.com](http://www.bestaccess.com).

2. Substitutions: 01 25 00 - Substitution Procedures.

- B. Wireless Access Management Systems: Comply with guidelines of BHMA A156.25, and including necessary hardware for fully functional system.
  1. Reader Formats: Provide magnetic stripe, proximity, dual validation, or key Fob to activate access system functionality.
  2. Door Locking Hardware: Provide applicable cylindrical locksets, panic hardware, or mortise locksets in compliance with project access control requirements.

#### 2.51 KEY CONTROL SYSTEMS

- A. Manufacturers:
  1. Sargent; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  2. Best, dormakaba Group: [www.bestaccess.com](http://www.bestaccess.com).
  3. Substitutions: 01 25 00 - Substitution Procedures.
- B. Key Control Systems: Comply with guidelines of BHMA A156.28.
  1. Provide keying information in compliance with DHI (KSN) standards.
  2. Keying: Grand master keyed.
  3. Include construction keying and control keying with removable core cylinders.
  4. Key to existing keying system.
  5. Supply keys in following quantities:
    - a. 4 each Master keys.
    - b. 1 each Grand Master keys.
    - c. 1 each Great Grand Master keys.
    - d. 6 each Construction Master keys.
    - e. 15 each Construction keys.
    - f. 2 each Construction Control keys.
    - g. 2 each Control keys if new system.
    - h. 2 each Extra Cylinder cores.
    - i. 2 each Change keys for each keyed core.
  6. Key Management System: For each keyed lock on project, provide one set of consecutively numbered duplicate key tags with hanging hole and snap catch.
  7. Security Key Tags: For each keyed lock on project, provide one set of matching key tags for permanent attachment to one key of each set.
  8. Deliver keys with identifying tags to Owner by security shipment direct from hardware supplier.
  9. Permanent Keys and Cores: Stamped with applicable key marking for identification. Do not include actual key cuts within visual key control marks or codes. Stamp permanent keys "Do Not Duplicate."
  10. Owner or Owner's agent install permanent cores and return construction cores to hardware supplier. Construction cores and keys to remain property of hardware supplier.

#### 2.52 KEY CABINET

- A. Manufacturers:
  1. Knox Company: [www.knoxbox.com](http://www.knoxbox.com).
  2. Substitutions: 01 25 00 - Substitution Procedures.
- B. Key Cabinet: Sheet steel construction, piano hinged door with key lock; BHMA A156.28.
  1. Mounting: Wall-mounted.
  2. Capacity: Actual quantity of keys, plus 25 percent additional capacity.
  3. Size key hooks to hold 6 keys each.
  4. Finish: Baked enamel, manufacturer's standard color.
  5. Key cabinet lock to building keying system.

#### 2.53 FIRE DEPARTMENT LOCK BOX

- A. Manufacturers:
  1. Knox Company; Knox-Box Rapid Entry System: [www.knoxbox.com](http://www.knoxbox.com).
  2. Substitutions: 01 25 00 - Substitution Procedures.

- B. Fire Department Lock Box:
  - 1. Heavy-duty, surface mounted, solid stainless-steel box with hinged door and interior gasket seal; single drill resistant lock with dust covers and tamper alarm.
  - 2. Capacity: Holds 10 keys.
  - 3. Finish: Manufacturer's standard dark bronze.

2.54 EXIT MOTION SENSOR

- A. Manufacturers:
  - 1. Securitron; an Assa Abloy Group company: [www.assaabloydss.com/#sle](http://www.assaabloydss.com/#sle).
  - 2. RCI, Dormakaba Group: [www.dormakaba.com](http://www.dormakaba.com)
  - 3. Substitutions: 01 25 00 - Substitution Procedures.
- B. Exit Motion Sensor: Interior passive infrared detection device to initiate door release of exit door magnetic lock.
  - 1. Power: 12 VDC.
  - 2. Provide adjustable detector face to allow for precise pattern configurations, and easy pattern adjustment.
  - 3. Provide relay that operates before transistor to prevent false alarms.
  - 4. Operating Temperature: 32 to 110 degrees F.

2.55 KEY PAD

- A. Manufacturers:
  - 1. Securitron; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. RCI, Dormakaba Group: [www.dormakaba.com](http://www.dormakaba.com)
  - 3. Substitutions: 01 25 00 - Substitution Procedures.
- B. Key Pad: Indoor or outdoor use, 12-key digital keypad with silicone rubber keys, and compatible with access control systems using standard Wiegand output.
  - 1. Power: 12 VDC; 35mA Active and 7mA at Rest.
  - 2. Mounts on narrow mullion, 1-1/2 inch wide by 7 inch high by 1 inch deep.
  - 3. Operating Temperature: Minus 22 to 158 degrees F.
  - 4. Finish: Black.

2.56 KEY SWITCH

- A. Manufacturers:
  - 1. Securitron; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. RCI, Dormakaba Group: [www.dormakaba.com](http://www.dormakaba.com)
  - 3. Substitutions: 01 25 00 - Substitution Procedures.
- B. Key Switch: Tubular key type, single gang, with bi-color LED.
  - 1. Power: 12 VDC.
  - 2. Operating Temperature: 32 to 110 degrees F.

2.57 POWER SUPPLY

- A. Manufacturers:
  - 1. Securitron; an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. RCI, dormakaba Group: [www.dormakaba.com](http://www.dormakaba.com)
  - 3. Substitutions: 01 25 00 - Substitution Procedures.
- B. Power Supply: Hard wired, with multiple zones providing eight (8) breakers for each output panel with individual control switches and LED's; UL (DIR) Class 2 listed.
  - 1. Power: 24 VAC, 10 Amp; with 120 VAC power supply.
  - 2. Operating Temperature: 32 to 110 degrees F.
  - 3. Provide with emergency release terminals that release devices upon activation of fire alarm system.

2.58 FINISHES

- A. Finishes: Provide door hardware of same finish, unless otherwise indicated.

1. Primary Finish: 625; bright chromium plated over nickel, with brass or bronze base material (former US equivalent US26); BHMA A156.18.
2. Secondary Finish: 626; satin chromium plated over nickel, with brass or bronze base material (former US equivalent US26D); BHMA A156.18.
  - a. Use secondary finish in kitchens, bathrooms, and other spaces containing chrome or stainless steel finished appliances, fittings, and equipment; provide primary finish on one side of door and secondary finish on other side if necessary.
3. Exceptions:
  - a. Where base material metal is specified to be different, provide finish that is an equivalent appearance in accordance with BHMA A156.18.
  - b. Hinges for Fire-Rated Doors: Steel base material with painted finish, in compliance with NFPA 80.
  - c. Door Closer Covers and Arms: Color as selected by MBI Companies from manufacturer's standard colors unless otherwise indicated.
  - d. Aluminum Surface Trim and Gasket Housings: Anodized to match door panel finish, not other hardware, unless otherwise indicated.
  - e. Hardware for Aluminum Storefront Doors: Finished to match door panel finish, except at hand contact surfaces provide stainless steel with satin finish, unless otherwise indicated.

2.59 HARDWARE SCHEDULE

**Set No. 1: Automatic Entry Doors - Exterior Pair**

Each to Have:

6	Hinges	BB1199	4 ½" x 4 ½"	NRP	US26D	(Hager)
1	Mullion	4854		SP28		(Von Duprin)
1	Electric Strike	6111-FSE			US32D	(Von Duprin)
1	Exit Device	99DT			US26D	(Von Duprin)
1	Exit Device	99NL			US26D	(Von Duprin)
1	Cylinder	As Required			US26D	(Schlage)
1	Automatic Operator	By Others				
1	Closer	4111-SCUSH			689	(LCN)
2	Kick Plates	190S	8" x 2" LDW		US32D	(Hager)
1	Threshold	425			ALUM	(NGP)
2	Sweeps	200NA			ALUM	(NGP)
1	Weatherstrip	127NA			ALUM	(NGP)
1	Mullion Seal	5100N			BLK	(NGP)

**Set No. 2: Automatic Entry Doors - Interior Pair**

Each to have:

6	Hinges	BB1168	4 ½" x 4 ½"		US26D	(Hager)
1	Mullion	4854			SP28	(Von Duprin)
1	Electric Strike	6111-FSE			US32D	(Von Duprin)
1	Exit Device	99DT			US26D	(Von Duprin)
1	Exit Device	99NL			US26D	(Von Duprin)
1	Cylinder	As Required			US26D	(Schlage)
1	Automatic Operator	By Others				
1	Closer	4111-SCUSH			689	(LCN)
2	Kick Plates	190S	8" x 2" LDW		US32D	(Hager)
2	Silencers	307D			Gray	(Hager)

**Set No. 2A: Reception from Vestibule**

Each to Have:

3	Hinges	BB1199	4 ½" x 4 ½" NRP	US26D	(Hager)
1	Electric Strike	6111-FSE		US32D	(Von Duprin)
1	Cylinder	As Required		US26D	(Schlage)
1	Automatic Operator	By Others			
1	Closer	4111-SCUSH		689	(LCN)
1	Kick Plate	190S	8" x 2" LDW	US32D	(Hager)

**Set No. 2B: Reception from Corridor**

Each to Have:

3	Hinges	BB1199	4 ½" x 4 ½" NRP	US26D	(Hager)
1	Passage	L9010		US26D	(Schlage)
1	Cylinder	As Required		US26D	(Schlage)
1	Closer	4111-SCUSH		689	(LCN)
1	Kick Plate	190S	8" x 2" LDW	US32D	(Hager)

**Set No. 3: Classroom – Interior**

1.5 pr	Butts	BB1279	4 ½" x 4 ½" NRP	US26D	(Hager)
1	Lever Security Classroom	LV9071		US26D	(Schlage)
1	Kick Plate	190S	8" x 2" LDW	US32D	(Hager)
1	Door Closer	3301BF			(Yale)
1	Doorstop				(Rockwood)
1	Smoke Seal				
3	Silencers	307D		Gray	(Hager)

**Set No. 4: Restroom**

1.5 pr	Butts	BB1279	4 ½" x 4 ½" NRP	US26D	(Hager)
1	Lever, privacy	LV9496 w/XL13-439		US26D	(Schlage)
1	Kick Plate	190S	8" x 2" LDW	US32D	(Hager)
1	Doorstop				(Rockwood)
	Silencers	307D		Gray	(Hager)

**Set No. 5: Classroom – Exterior**

1.5 pr	Butts	BB1199	4 ½" x 4 ½" NRP	US26D	(Hager)
1	Electric Strike	6111-FSE		US32D	(Von Duprin)
1	Exit Device	99NL		US26D	(Von Duprin)
1	Cylinder	As Required		US26D	(Schlage)
1	Closer	4111-SCUSH		689	(LCN)
1	Kick Plate	190S	8" x 2" LDW	US32D	(Hager)
1	Threshold	425		ALUM	(NGP)
1	Sweep	200NA		ALUM	(NGP)
1	Weather Strip	127NA		ALUM	(NGP)

**Set No. 6: Kitchenette – Dutch Door**

1.5 pr	Butts	BB1279	4 ½" x 4 ½" NRP	US26D	(Hager)
1	Lever, Privacy	LV9040		US26D	(Schlage)
1	Doorstop				(Rockwood)
2	Silencers	307D		Gray	(Hager)

**Set No. 7: Interior – Mechanical**

1.5 pr	Butts	BB1199	4 ½" x 4 ½" NRP	US26D	(Hager)
1	Lever, Storeroom	L9465		US26D	(Schlage)
1	Door Closer	3301BF			
1	Doorstop				(Rockwood)
3	Silencers	307D		Gray	(Hager)

**Set No. 8: Exterior Mechanical, Electrical**

3 pr	Butts	BB1199	4½" x 4 ½" NRP	US26D	(Hager)
2	Flush Bolts	282D			(Hager)
1	Lever, Storeroom	L9080-17/B	Knurled O.S. Lever	US26D	(Schlage)
1	Latch Guard	1625			(Ives)
2	Overhead Holders	GJ70H Series			(Glynn Johnson)
1	Threshold	894V		Alum.	(NGP)
1 set	Weatherstrip	127NA		Alum.	(NGP)
1	Dripcap	16A x M.O. Width		Alum.	(NGP)
	Astragal complete with metal doors				

**Set No. 9: Exterior Entry**

6	Hinges	BB1199	4½" x 4 ½" NRP	US26D	(Hager)
1	Removable Mullion	4954	SP28		(Von Duprin)
1	Exit Device	99DT		US26D	(Von Duprin)
1	Exit Device	99NL		US26D	(Von Duprin)
1	Mag Lock				
2	Closers	4111-SCUSH		689	(LCN)
2	Kickplates	1905	8" x 2" LDW	US32D	(Hager)
1	Threshold	425		Alum.	(NGP)
2	Sweeps	200NA		Alum.	(NGP)
1	Weatherstrip	127NA		Alum.	(NGP)
1	Mullion Seal	5100N		Blk	(NGP)

**Set No. 10: Office**

3	Hinges	BB1279	4½" x 4 ½" NRP	US26D	(Hager)
1	Lever, Office	LV9050		US26D	(Schlage)
1	Doorstop				(Rockwood)
3	Silencers	307D		Gray	(Hager)

**Set No. 11: Conference**

3	Hinges	BB1279	4½" x 4 ½" NRP	US26D	(Hager)
1	Lever, Priv. w/ Deadbolt	LV9444		US26D	(Schlage)
1	Doorstop				(Rockwood)
3	Silencers	307D		Gray	(Hager)

**Set No. 12: Secure Storage**

3	Hinges	BB1279	4½" x 4 ½" NRP	US26D	(Hager)
1	Storeroom	LV9080		US26D	(Schlage)
1	Doorstop				(Rockwood)
3	Silencers	307D		Gray	(Hager)

**Set No. 13: Workrooms**

3	Hinges	BB1279	4½" x 4 ½" NRP	US26D	(Hager)
1	Passage	L9010		US26D	(Schlage)
1	Doorstop				(Rockwood)
3	Silencers	307D		Gray	(Hager)

**Set No. 14: Classroom Shelter**

3	Hinges	BB1279	4½" x 4 ½" NRP	US26D	(Hager)
1	3 pt Classroom Security	LMV9371		US26D	(Schlage)
1	Door Closer	4111-SCUSH		689	(LCN)
1	Doorstop				(Rockwood)
3	Silencers	307D		Gray	(Hager)

**Set No. 15: Janitor Closet**

3	Hinges	BB1279	4½" x 4 ½" NRP	US26D	(Hager)
1	Storeroom	LV9080		US26D	(Schlage)
1	Kick Plate	190S	8" x 2" LDW	US32D	(Hager)
1	Doorstop				(Rockwood)
3	Silencers	307D		Gray	(Hager)

**Set No. 16: Connector**

6	Hinges	BB1168	4½" x 4 ½"	US26D	(Hager)
1	Mullion	4954		SP28	(Von Duprin)
1	Exit Device	99NL		US26D	(Von Duprin)
1	Cylinder	As Required		US26D	(Schlage)
2	Closers	4111-SCUSH		689	(LCN)
2	Kick Plates	1905	8" x 2" LDW	US32D	(Hager)
2	Silencers	307D		Gray	(Hager)
2	Magnetic Holders				(Rixson)

**Set No. 17: Kitchen**

2	Hinges	BB1279	4½" x 4 ½" NRP	US26D	(Hager)
1	Lever, Office	ND92PD-SPA		US26D	(Schlage)
1	Kick Plate	190S	8" x 2" LDW	US32D	(Hager)
1	Doorstop & Holder	495			(Rockwood)
3	Silencers	307D		Gray	(Hager)

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.
- B. Verify that electric power is available to power operated devices and of correct characteristics.

**3.02 INSTALLATION**

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.
- C. Install hardware for smoke and draft control doors in accordance with NFPA 105.

- D. Use templates provided by hardware item manufacturer.
- E. Do not install surface mounted items until application of finishes to substrate are fully completed.
- F. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.
  - 1. For Steel Doors and Frames: Install in compliance with DHI (LOCS) recommendations.
  - 2. For Steel Doors and Frames: Refer to Section 08 11 13.
  - 3. For Steel Door Frames: Refer to Section 08 12 13.
  - 4. For Aluminum-Framed Storefront Doors and Frames: Refer to Section 08 43 13.
  - 5. For Wood Doors: Install in compliance with DHI WDHS.3 recommendations.
  - 6. Flush Wood Doors: Refer to Section 08 14 16.
  - 7. Mounting heights in compliance with ADA Standards:
    - a. Locksets: 40-5/16 inch.
    - b. Push Plates/Pull Bars: 42 inch.
    - c. Deadlocks (Deadbolts): 48 inch.
    - d. Exit Devices: 40-5/16 inch.
    - e. Door Viewer: 43 inch; standard height 60 inch.
- G. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.
  - 1. Refer to Section 07 92 00 for additional requirements.

### 3.03 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Section 01 40 00 - Quality Requirements.
- B. Provide an Architectural Hardware Consultant (AHC) to inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

### 3.04 ADJUSTING

- A. Adjust work under provisions of Section 01 70 00 - Execution and Closeout Requirements.
- B. Adjust hardware for smooth operation.
- C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

### 3.05 CLEANING

- A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.
- D. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

### 3.06 PROTECTION

- A. Protect finished Work under provisions of Section 01 70 00 - Execution and Closeout Requirements.
- B. Do not permit adjacent work to damage hardware or finish.

END OF SECTION

## PART 1 GENERAL

### 1.01 SUMMARY

- A. Furnish all labor, material, equipment, and supervision to provide and install full energy, powered door operators for swinging doors where indicated on the drawings and in accordance with the specified requirements.

### 1.02 RELATED DOCUMENTS

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section 07 92 00 – Joint Sealants.  
Division 26 – Electrical.  
Division 28 - Electronic Safety and Security.

### 1.03 REFERENCES

- A. References: Comply with the version year adopted by the Authority Having Jurisdiction.
1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
  2. ICC/IBC - International Building Code.
  3. NFPA 70 - National Electrical Code.
  4. NFPA 80 - Fire Doors and Windows.
  5. NFPA 101 - Life Safety Code.
  6. NFPA 105 - Installation of Smoke Door Assemblies.
- B. American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA).
1. ANSI/BHMA A156.10 American National Standard for Power Operated Pedestrian Doors.
  2. ANSI/BHMA A156.19 Standards for Power Assist and Low Energy Power Operated Doors.
- C. Underwriters Laboratories (UL).
1. UL Listed R-9469 Fire Door Operator with Automatic Closer.
  2. UL10C – Positive Pressure Fire Tests of Door Assemblies.
  3. UL 325 - Standard for Safety for Door, Drapery, Gate, Louver, and Window Operators and Systems.
  4. UL991 Listed - Tests for Safety-Related Controls Employing Solid-State Device.
  5. UL244A – Solid – State Controls for Appliances.
  6. UL1998 – Software in Programmable Components.
  7. UL1310 – Class 2 Power Units.
- D. American Association of Automatic Door Manufacturers (AAADM).
- E. American Society for Testing and Materials (ASTM).
1. ASTM B221 Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
  2. ASTM B209 Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate.
- F. American Architectural Manufacturers Association (AAMA).
1. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum.

G. National Association of Architectural Metal Manufacturers (NAAMM).

1. Metal Finishes Manual for Architectural Metal Products.

H. International Code Council (ICC).

1. IBC: International Building Code Building Code.

1.04 DEFINITIONS

- A. Double Swing Doors: A pair of doors that swing with the two doors moving in opposite directions with a mullion between them; each door functioning as a single swing door.
- B. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to activate the operation of the door.
- C. Knowing Act: Consciously initiating the opening of a power operated door using acceptable methods including wall mounted switches such as push plates and controlled access devices such as keypads, card readers and key switches.
- D. Safety Device: A device that detects the presence of an object or person within a zone where contact could occur and provides a signal to stop the movement of the door.

1.05 PERFORMANCE REQUIREMENTS

- A. Provide automatic door operators that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer's corresponding standard systems.
- B. Automatic door equipment accommodates medium to heavy pedestrian traffic and have the following minimum performance characteristics:
  1. Up to 700 pound (317.5 kg) weight of doors, 48 inches (1219 mm) maximum door width per operator.
- C. Operator capable of operating within temperature ranges of -31° F to 160° F (-35° C to 71° C).
- D. Opening Force requirements for Egress Doors: In the event of power failure to the operator, swinging automatic entrance doors shall open with a manual force, not to exceed 30lbf (133N) applied at 1" (25 mm) from the latch edge of the door.
- E. Break Away Device: Swinging automatic entrances shall require no more than 50 lbf (222 N) applied 1" (25 mm) from the latch edge of the door. When the door(s) is opened in the breakout mode, powered operated components excluding spring power shall not operate the doors.
- F. Closing Time:
  1. Doors shall be field adjustable to close from 90 degrees to 10 degrees in 2 seconds or longer as applicable per ANSI/BHMA A156.10 standards.
  2. Doors shall be field adjusted to close from 10 degrees to fully closed in not less than 1.5 seconds.

1.06 SUBMITTALS

- A. Product Data: Manufacturer's product sheets including installation details, material descriptions, dimensions of individual components and profiles, fabrication, operational descriptions and finishes.

- B. Shop Drawings: Submit manufacturer's shop drawings, including elevations, sections and details, indicating dimensions, materials, operator, safety sensor control device, anchors, hardware, finish, options and accessories.
  - 1. Indicate required clearances, and location and size of each field connection.
  - 2. Indicate locations and elevations of entrances showing activation and safety devices.
  - 3. Wiring Diagrams: For power, signal, and activation / safety device wiring.
- C. Samples: Submit manufacturer's samples of aluminum finish.
- D. Manufacturers Field Reports: Submit manufacturer's field reports from AAADM certified technician of inspection and approval of doors for compliance with ANSI/BHMA A156.10 after completion of installation.
- E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door opening installation in quantity as required in Division 01. The manual shall include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include spare parts list.
- F. Warranties and Maintenance: Special warranties and maintenance agreements specified in this Section.

1.07 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 10 years of documented experience in manufacturing of doors and equipment of similar to that indicated for this Project and that have a proven record of successful in-service performance.
  - 1. A manufacturer with company certificate issued by AAADM.
- B. Installer Qualifications: Installers, trained by the primary product manufacturers, with a minimum 5 years documented experience installing and maintenance of units similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- C. Certified Inspector Qualifications: Certified by AAADM.
- D. Source Limitations for Automatic Operators: Obtain each type of door operator and sensor components specified in this Section from a single source, same manufacturer unless otherwise indicated.
- E. Certifications: Operators shall be certified by the manufacturer to meet performance design criteria in accordance with the following standards.
  - 1. ANSI/BHMA A156.10 American National Standard for Power Operated Pedestrian Doors.
  - 2. NFPA 101 - Life Safety Code.
  - 3. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.
  - 4. UL Listed R-9469 Fire Door Operator with Automatic Closer.
- F. Emergency Exit door requirements: Comply with requirements of authorities having jurisdiction for automatic entrance doors serving as a required means of egress.

1.08 COORDINATION

- A. Coordinate door operators with doors, frames and related work to ensure proper size, thickness, hand, function and finish. Coordinate hardware for automatic entrances with hardware required for rest of the project.

- B. Electrical System Roughing-in: Coordinate layout and installation of power door operators with connections to power supplies and access control system as applicable.

1.09 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Automatic Door Operators shall be free of defects in material and workmanship for a period of one (1) year from the date of substantial completion.
- C. During the warranty period a factory-trained technician shall perform service and affect repairs. An inspection shall be performed after each adjustment or repair.
- D. During the warranty period all warranty work, including but not limited to emergency service, shall be performed during normal business hours.
- E. Manufacturer shall have in place a dispatch procedure that shall be available 24 hours a Day, 7 Days a week for emergency call back service.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Basis of Design: ASSA ABLOY Entrance Systems, 1900 Airport Road, Monroe, NC 28110, 877-773-2123 / 704-290-5520, Fax: 704-290-5555, [assaabloyentrance.com](http://assaabloyentrance.com), [specdesk.na.aes@assaabloy.com](mailto:specdesk.na.aes@assaabloy.com).
- B. Manufacturers pre-approved to product products meeting or exceeding the specified requirements are as follows:
1. Horton Automatics
  2. Stanley Access Technologies
  3. Additional alternate manufacturers must be approved by Architect in writing by Addendum prior to Bidding.

2.02 AUTOMATIC SWING DOOR OPERATOR

- A. Configuration: Operator to control single swinging doors and pairs of swinging doors as indicated on the drawings.
- B. Automatic Operator: Electro-mechanical, non-handed operator, powered by 24 volt, 1/4 hp motor equal to Besam SW200i full energy automatic door operator. Operator shall be adjustable to compensate for different manual push forces as required.
1. Automatic operator shall be capable of operating and controlling up to a 700 pound (317.5 kg) door, 48 inches (1219 mm) in width.
  2. Surface Mounted Operator:
    - a. Operator is contained in 5-1/8" (130.2 mm) deep x 4 5/16" (110 mm) high extruded aluminum housing with a removable cover.
    - b. Surface Mounted Housing: Continuous for full width of door.
    - c. Connecting Hardware: Operators to have a steel arm from the operator, mounted to the top face of the swing door.

- d. UL Listed R-9469 Fire Door Operator with Automatic Closer where indicated in drawings.
  - 3. Operator can be field adjusted to comply with ANSI/BHMA A156.19 American National Standard for Power Assist and Low Energy Operated Doors. Activation devices may also need to be switched to knowing-act activation devices for compliance with ANSI/BHMA A156.19.
  - 4. Electrical Characteristics: Maximum power consumption is 300 watts (2.5 amps at 120 VAC), 50/60hz, built-in thermal overload protection.
  - 5. Battery Convenience Mode: Operator to maintain continuous operation by battery power during power failure. Battery is continuously monitored and provides a warning signal if the battery is not working properly.
  - 6. Digital Cycle Counter: Battery powered, 7 digit LCD cycle counter with a reset feature to track door usage cycles.
- C. Door Operation:
- 1. Opening Cycle: The adjustable speed operator mechanically powers the drive shaft and the torque control maintains constant speed throughout the opening cycle regardless of stack pressures or wind speed. Operator shall allow manual door operation with operational forces as indicated to fully open the door applied at 1" (25 mm) from the latch edge of the door.
    - a. Manual push force shall be adjustable from 5 lbf to 30 lbf maximum.
  - 2. Hold Open: The operator shall stop and hold the door open at the selected door opening angle for an adjustable period of time (1.5 seconds to 30 seconds).
  - 3. Closing Cycle: Spring close with speed controlled power assist.
    - a. Upon loss of power, dynamic braking will control the door insuring controlled closing.
    - b. Selectable Torque Control: Automatically adjusts torque without changing the closing speed of the operator.
      - i. When the torque control is activated, the closing speed shall remain constant regardless of stack pressures or wind speed.
      - ii. Torque Cancellation: The torque control is deactivated whenever there is a signal received from door mounted sensors.
      - iii. The torque control is disabled during manual use of the door.
  - 4. Wind Force Dampening: The operator electromechanically counteracts wind forces, slowing down the door movement to safely open or close the door.
  - 5. Stack Pressure Compensation: Operator shall counteract positive stack pressures, negative stack pressures, and sudden changes of stack pressures. The operator never allows the door to open or close faster than the speed control settings, regardless of pressures.
  - 6. Obstruction Control: The operator will stop and reverse the door movement.
  - 7. Electric Lock Management:
    - a. Internal module for electrified locking integration.
    - b. Electric Lock Output: Selectable 12 VDC, maximum 1200 mA / 24 VDC, maximum 600 mA.

- c. Lock monitoring prevents operator(s) from opening door(s) until release of electrified lock.
  - d. Operator pulls door closed before opening, automatically unjamming electric latch hardware.
  - e. Sequenced operation between operators for pairs of doors allowing lock release and astragal coordination.
- 8. Lock Retry Circuit: If attempt to fully close the door is unsuccessful, the operator will automatically reverse open 10 degrees and reclose in an attempt to successfully close the door.
- 9. Selectable Alarm Reset: The operator can be field set so that after receiving an alarm signal, the operator will not accept any activation impulses and will operate only as a manual door closer until manually reset.
- 10. Electronic Controls: Solid state integrated circuit controls the operation and switching of the swing power operator. The electronic control provides low voltage power supply for all means of actuation. The controls include time delay (1 to 30 seconds) for normal cycle.
- 11. Control Switch: Automatic door operators shall be equipped with the following type of multi-position function switch:
  - a. 3 position rocker switch mounted on end cap (On-Auto-Hold).
- D. Operator Interface: Safety Sensor Integration for overhead presence safety device and door mounted reactivation safety sensors.

#### 2.03 ACTIVATION DEVICES

- A. General: Provide activation devices in accordance with ANSI/BHMA A156.10 standards, for condition of exposure and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated. Coordinate activation and devices with door operation and door operator mechanisms.
- B. Knowing Act Activation Device:
  - 1. Push Plate: Hard wired, 6 inch round, stainless steel push plate switches engraved with "Push to Open" with a blue handicap logo.
  - 2. Secondary activation: Where activation is by a "knowing act" device, provide a secondary activation sensor as required by ANSI/BHMA A156.10.

#### 2.04 SAFETY DEVICES

- A. General: Provide safety devices in accordance with ANSI/BHMA A156.10 standards, for condition of exposure and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated. Coordinate safety devices with door operation and door operator mechanisms.
- B. Safety Devices: Besam I-Adapt Flex Safety Sensor System A102 (Basis of Design), Combination of a Door Mounted Presence Sensors (DMPS) as specified:
  - 1. Door Mounted Presence Sensor (DMPS): Door mounted infrared presence safety device (mounted at top of each door); adjustable to provide detection field sizes and functions required by ANSI/BHMA A156.10.
    - a. The door mounted presence detector shall be mounted on both the swing (pull) side and the approach (push) side of the door (2 sensors per leaf), providing detection on both sides of the door.
    - b. Unit to provide detection during the travel of the door.

- c. Upon detection the sensor shall provide a signal to stop or reverse the door action.

## 2.05 ACCESSORIES

- A. Where required by code and/or indicated on drawings, provide guide rails. Guide Rails shall be minimum 30 inches (762 mm) high, and of type and finished to match doors unless otherwise indicated; positioned and projecting from face of door jamb for distance as indicated, but not less than that required by ANSI/BHMA A156.10 for type of door and direction of travel; with filler panel.
1. Configuration and dimensions shall be as indicated on the drawings AND shall meet code requirements. If dimensions are not provided, Architect shall provide desired dimensions after code requirements are provided.
  2. Material and finish shall match door frame.
  3. Mounting: Floor, freestanding.
  4. Filler Panel: If required by code, provide expanded aluminum mesh panel(s) oriented with long dimension of diamonds vertical. Color to match Architect's sample.

## 2.06 ALUMINUM FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Automatic Operator Enclosure:
1. For mounting on anodized storefront or other anodized aluminum surfaces, provide Clear or Color anodized to match adjacent surface to meet AAMA 611, Clear, AA- M12C22A41/44, Class I, 0.018 mm.
  2. For mounting on Kynar-coated or other painted surfaces including drywall, provide 2-coat Kynar finish to match adjacent color.
  3. For mounting on clad/metal surfaces match metal type and finish.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, wall and floor construction, and other conditions affecting performance.
- B. Examine roughing-in for electrical source power to verify actual locations of wiring connections.
- C. Proceed only after such discrepancies or conflicts have been resolved.

### 3.02 INSTALLATION

- A. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints.
- B. Operators: Install automatic operators plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place.
1. Install surface mounted hardware using concealed fasteners to greatest extent possible.
  2. Set headers, carrier assemblies, tracks, operating brackets and guides level and true to location with anchorage for permanent support.

- C. Door Operators: Connect door operators to electrical power distribution system as indicated on drawings and/or as specified elsewhere. If building has, or is to have, a smoke evacuation system and/or fire detection system, connect door operator to any and all such systems.
- D. Sealants: Comply with requirements specified in division 7 Section "Joint Sealants" to seal between the operator housing and the adjacent wall surface.
- E. Signage: Apply signage on both sides of each door and sidelite as required by ANSI/BHMA A156.10 and manufacturers installation instructions.

### 3.03 FIELD QUALITY CONTROL

- A. Manufacturers Field Services:
  - 1. Manufacturer's representative shall provide technical assistance and guidance for installation of doors.
  - 2. Before placing doors into operation, AAADM certified technician shall inspect and approve doors for compliance with ANSI/BHMA A156.10. Certified technician shall be approved by manufacturer.

### 3.04 ADJUSTING

- A. Adjust door operators, controls and hardware for smooth and safe operation and for weather tight closure. Adjust doors in compliance with ANSI/BHMA A156.10.

### 3.05 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by automatic operator installation.
- B. Clean metal surfaces promptly after installation. Remove excess sealants, compounds, dirt and other substances. Repair damages finish to match original finish.

### 3.06 DEMONSTRATION

- A. Engage a factory-authorized representative to train Owner's maintenance personnel to adjust, operate, and maintain safe operation of the door.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

- A Glass in doors, in windows, in exterior walls, and in fixed-glass hollow metal view windows on the interior.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.
1. Section 07 92 00 – Joint Sealants.
  2. Section 08 88 53 – Security Glazing.

1.03 QUALITY OF GLASS

- A Glass shall meet or exceed the requirements of Federal Specifications DD-G-451C and each piece of glass shall bear factory applied label. Tempered glass shall meet the requirements of Federal Specification DD-G-1403B. Glass shall be equal to that manufactured by Vitro Architectural Glass; Libby-Owens-Ford Company; or ASG Industries.
- B Provide insulating glass units permanently marked either on spacers or at least one component lite of units with appropriate certification label of the Insulating Glass Certification Council.

1.04 SUBMITTALS

- A Product Data: For each glass product and glazing material indicated.
- B Samples: For the following products, in the form of 12-inch- (300-mm-) square Samples for glass.
1. Each color of tinted float glass.
  2. Coated vision glass.
  3. Wired glass.
  4. Insulating glass for each designation indicated.
- C Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
- D For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.
- E Qualification Data: For installers.

1.05 WARRANTY

- A Submit written warranty signed by manufacturer of insulating glass agreeing to furnish replacements for insulating glass units that suffer failure of seal (as indicated by dust accumulation on inner surfaces, fogging, or accumulation of vision obstructing film on inner surfaces) during normal usage due to causes other than breakage, improper maintenance, or improper cleaning. Replacements shall be furnished F.O.B. point of manufacturer, freight allowed Project site, within the specified warranty period indicated below
1. Insulated Glass: Manufacturer's standard, ten year minimum period.
  2. Float Glass: Manufacturer's standard, five year minimum period.
  3. Laminated Glass: Manufacturer's standard, five year minimum period.
  4. Mirrors: Manufacturer's standard fifteen year period protecting against silver spoilage.

PART 2 PRODUCTS

2.01 TYPES OF GLASS

- A Glass for use in exterior entrance doors and elsewhere as required by Federal and State Safety Glazing Laws shall be tempered safety glass conforming to requirements of Federal Safety Standard 16CFR1201.
- B. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.
- C. Glazing for Fire-Rated Window Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.
- D. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 and, for wired glass, ANSI Z97.1.
  - 1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
- B Clear glass in exterior vision windows shall be Twindow 1" thick insulated glass with 1/2" air space and two 1/4" Lites, interior lite clear, exterior lite clear, as manufactured by Vitro Architectural Glass and shall meet the certification requirements of I.G.C.C. for a Class CBA rating. Glass shall meet the quality criteria of Federal Specification DD-G-451D. Coatings shall be applied under controlled factory conditions of the manufacturer.
  - 1. Low-E Coating or Film: Pyrolytic or sputtered on second or third surface.
  - 2. Low-E Insulating glass units shall have a Maximum U value of 0.29, a Maximum Shading Coefficient of 0.37 and a Maximum Solar Heat Gain Coefficient of 0.29
- C Tinted glass in exterior vision windows shall be Twindow 1" thick insulated glass with 1/2" air space and two 1/4" Lites, interior lite clear, exterior lite solar gray, as manufactured by Vitro Architectural Glass and shall meet the certification requirements of I.G.C.C. for a Class CBA rating. Glass shall meet the quality criteria of Federal Specification DD-G-451D. Coatings shall be applied under controlled factory conditions of the manufacturer.
  - 1. Low-E Coating or Film: Pyrolytic or sputtered on second or third surface.
  - 2. Low-E Insulating glass units shall have a Maximum U value of 0.29, a Maximum Shading Coefficient of 0.37 and a Maximum Solar Heat Gain Coefficient of 0.29
- D Mirrors: Tempered float glass with successive layers of chemically deposited silver, electrically or chemically deposited copper, and manufacturer's standard organic protective coating applied to glass surface to produce a coating system complying with FS DD-M-411.
  - 1. Cut mirrored glass to final sizes and shapes to suit Project conditions.
  - 2. Treat edges with flat polished edge.
  - 3. Seal edges of silvered mirrored glass after edge treatment to prevent chemical or atmospheric penetration of glass coating.
  - 4. Require mirrored glass manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.
- E Glass for interior butt jointed glass panels shall be 1/2" thick clear uncoated, fully tempered float glass Type I (transparent glass, flat), Class 1 (clear) conforming to requirements of Federal Safety Standard 16CFR1201.
- F All spandrel glass shall be ceramic coated spandrel glass: ASTM C 1048, Condition B(spandrel glass, one-surface ceramic coated), Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select), and complying with requirements specified .

1. Fallout Resistance: Provide spandrel units identical to those passing fallout resistant test for spandrel glass specified in ASTM C 1048.
2. Kind of heat treatment: Kind HS (heat strengthened) and Kind FT (fully tempered) where coated safety glass is designated or required.
3. Location of ceramic coating: Fourth surface.
4. Ceramic coating color and pattern: Provide color and pattern to match specified vision lites.

G Hurricane/Impact Resistant Glass shall be: Twindow 1 5/16" thick insulated glass with 1/2" air space and two Lites, interior lite 1/4" Solarban 80 on clear, exterior lite laminated safety glass 1/4" solar bronze over clear with a test compliant interlayer, and shall meet the quality criteria of Federal Specification DD-G-451D and Heat Treated glass complying with FS DD-G-1403

1. Acceptable Products:
  - a. Arch Aluminum Impact Resistant Glass
  - b. Glasslam N.G.I., Inc. Safety Plus®
  - c. Insulgard Corp. Coastgard™
  - d. Interpane Glass, Securpane®
  - e. Saflex Hurricane Resistant Glass,
  - f. Viracon HRG-2
2. Performance Characteristics:
  - a. Visible Light Transmittance: 16.
  - b. Visible Light Reflectance: 12 to 16 percent.
  - c. Total Solar Energy Transmittance: 12 percent.
  - d. Total Solar Energy Reflectance: 9 percent.
  - e. UV Transmittance: 14 to 16 percent.
  - f. Summer U-Value 0.48.
  - g. Winter U-Value: 0.46.
  - h. Solar Heat Gain Coefficient: 0.35.
  - i. Shading Coefficient: 0.40.

## 2.02 FIRE RATED GLAZING MATERIALS

A Manufacturer: FireLite®Plus as manufactured by Nippon Electric Glass Company, Ltd., and distributed by Technical Glass Products, Kirkland, Washington, voice 1-800-426-0279, fax 1-800-451-9857, e-mail sales@fireglass.com, web site www.fireglass.com.

### B. Properties:

1. Thickness: 5/16 inch [8 mm] overall.
2. Weight: 4 lbs./sq. ft.
3. Approximate Visible Transmission: 85 percent.
4. Approximate Visible Reflection: 9 percent.
5. Fire-rating: 20 minutes to 3 hours for doors; 20 minutes to 90 minutes for other applications.
6. Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II).
7. STC Rating: Approximately 35 dB.
8. Surface Finish: Premium (polished).
9. Positive Pressure Test: UL 10C, UBC 7-2 and 7-4; passes.

D. Labeling: Permanently label each piece of FireLite®Plus with the FireLite® logo, UL logo and fire rating in sizes up to 3,325 sq. in., and with the FireLite label only for sizes that exceed the listing (as approved by the local authority having jurisdiction).

E. Fire Rating: Fire rating listed and labeled by UL for fire rating scheduled at opening locations on drawings, when tested in accordance with NPFA 252 and NFPA 257.

F. Substitutions must be approved by Architect prior to bidding.

2.03 GLASS SIZES

- A Obtain glass sizes at the building or from manufacturer of frames and sashes into which glass is to be set. Responsibility for correct glass size rests with the Contractor.

2.04 GLAZING MATERIAL

- A Unless factory glazing is provided, elastic glazing compound shall be Pecora Chemical Company Challen Glazing Compound M-251, or equal products of Tremco or DAP. Butyl tape shall be Tremco Polyshim Tape.

2.05 GLAZING ACCESSORIES

- A Channels for receiving butt jointed glass shall be the product of Stylmark Inc. P.O. Box 32008 Minneapolis MN 55432, Phone: (800) 328-2495, Fax: (763) 574-1415 or approved equal.
1. Top channel: #110360 5/8" x 2" for 1/2" glass
  2. Bottom channel: #110361 5/8" x 1" for 1/2" glass.
  3. Clear Anodized Finish: Provide NAAMM AA-M12C22A31, Class I (mechanical finish, non-specular as fabricated; chemical etch, medium matte; Anodic Coating: Architectural Class I clear coating 0.018 mm or thicker) complying with AAMA 607.1
  4. Vinyl glazing bead: #226013
  5. Rubber setting blocks: #226015 5/8" x 1/4"
  6. Provide fasteners of nonmagnetic stainless steel, or other materials warranted by the manufacturer to be non-corrosive and compatible with aluminum components, hardware, anchors and other components. Install in accordance with manufacturer's instructions.
- B. Unless factory glazing is provided, elastic glazing compound shall be Pecora Chemical Company Challen Glazing Compound M-251, or equal products of Tremco or DAP. Butyl tape shall be Tremco Polyshim Tape.

PART 3 EXECUTION

3.01 GLAZING

- A Bottom of glass shall be set on wood or plastic setting blocks and similar spacers shall be used at vertical edges of glass to maintain proper clearance from metal and wood frames.
- B In hollow metal glass window frames and doors, bed glass in elastic glazing compound to prevent rattling and carefully install removable metal glazing beads. On exterior doors and windows, back-putty glazing bead to insure watertightness.
- C Glazing shall not be done when temperature is below 40° F. Sash and frames shall be dry and free from dust when glazed. Remove all excess glazing compound and stains from sash, frames and glass immediately after glazing.
- D Glazing procedures shall conform to recommendations outlined in the Glazing Manual of the Flat Glass Marketing Association. Basic points of good practice shall include: clean cut edges, no nipping or seamed edges, edge openings in a true plane, and resilient setting blocks at quarter points.
- E Seal joints between pieces of butt-jointed glass with clear silicone sealant similar and equal to GE Silicone Sealant RVT108 or Tremco Spectrem 2.

3.02 INSTALLING FIRE RATED GLAZING MATERIALS

- A Comply with referenced FGMA standards and instructions of manufacturers of glass, glazing sealants, and glazing compounds.

- B. Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.
- C. Set units of glass in each series with uniformity of pattern, draw, bow, and similar characteristics.
- D. Cut glazing tape to length and set against permanent stops, flush with sight lines to fit openings exactly, with stretch allowance during installation.
- E. Place setting blocks located at quarter points of glass with edge block no more than 6 inches from corners.
- F. Glaze vertically into labeled fire-rated metal frames or partition walls with same fire rating as glass and push against tape for full contact at perimeter of pane or unit.
- G. Place glazing tape on free perimeter of glazing in same manner described above.
- H. Install removable stop and secure without displacement of tape.
- I. Use specified glazing compound, without adulteration; bed glazing material in glazing compound; entirely fill all recess and spaces. Provide visible glazing compound with smooth and straight edges.
- J. Install in vision panels in fire-rated doors to requirements of NFPA 80.
- K. Install so that appropriate UL and/or FireLite®Plus markings remain permanently visible.

3.03 GLASS BREAKAGE

- A Replace all breakage caused in executing the work or by faulty installation. Improperly set glass or glass which does not fully meet the requirements for its grade will not be accepted. At completion of work, glass shall be whole and free from cracks, scratches, and rattles.

3.04 CLEANING

- A Just before final inspection of the building, clean and wash glass and remove all labels.

END OF SECTION



PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Laminated glass.

1.02 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections.
- B. Related Sections:
1. Section 08 80 00 – Glazing: Nonsecurity glazing in the form of monolithic glass, laminated glass, and insulating glass.

1.03 DEFINITIONS

- A. Glazing Manufacturers: Firms that produce primary glass, monolithic plastic glazing, or fabricated security glazing, as defined in referenced glazing publications.
- B. Interspace: Space between lites of air-gap security glazing or insulating security glazing.

1.04 PERFORMANCE REQUIREMENTS

- A. General:
1. Installed security glazing shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing; or other defects in construction.
  2. Installed security glazing shall withstand security-related loads and forces without damage to the glazing beyond that allowed by referenced standards.

1.05 REFERENCES

- A. ASTM International:
1. ASTM C509 – Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material.
  2. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
  3. ASTM C1021 – Standard Practice for Laboratories Engaged in Testing of Building Sealants.
  4. ASTM C1036 – Standard Specification for Flat Glass.
  5. ASTM C1172 – Standard Specification for Laminated Architectural Flat Glass.
  6. ASTM C1281 - Standard Specification for Preformed Tape Sealants for Glazing Applications.
  7. ASTM D1929 – Standard Test Method for Determining Ignition Temperature of Plastics.
  8. ASTM D2843 - Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics.
  9. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.06 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Security Glazing Samples: For each type of security glazing; 12 inches (300 mm) square.

- C. Security Glazing Schedule: List security glazing types and thicknesses for each size opening and location. Use same designations indicated on Drawings. Indicate coordinated dimensions of security glazing and construction that receives security glazing, including clearances and glazing channel dimensions.
- D. Qualification Data: For installers.
- E. Product Certificates: From manufacturer for each type of product indicated.
- F. Warranties: Sample of special warranties.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating Security Glazing Units with Sputter-Coated, Low-E Coatings: A qualified insulating glazing manufacturer who is approved by coated-glass manufacturer.
- B. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.
- C. Source Limitations for Security Glazing: Obtain security glazing from single source from single manufacturer using the same type of lites, plies, interlayers, and spacers for each security glazing type indicated.
  - 1. Source Limitations for Tinted Glass: Obtain tinted glass from single source from single primary glass manufacturer for each tint color indicated.
- D. Source Limitations for Glazing Sealants and Gaskets: Obtain from single source from single manufacturer for each product and installation method

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect security glazing and glazing materials according to manufacturer's written instructions. Prevent damage from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating security glazing and with air-gap security glazing manufacturers' written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.09 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
  - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F (4.4 deg C).

1.10 COORDINATION

- A. Coordinate dimensions, including thickness, of security glazing with dimensions of construction that receives security glazing.

1.11 WARRANTY

- A. Security Glass: Submit written warranty agreeing to repair or replace glass and glazing materials which fail to perform as specified, including leakage of water, or failure in joint adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, delamination, yellowing, breakage, coating failure and loss of light transmission for all assemblies, extending for five years after completion of project.

- B. Show endorsement of glazier/installer on all warranties.

## PART 2 PRODUCTS

### 2.01 SECURITY GLAZING, GENERAL

- A. Thickness: Where thickness is indicated, it is a minimum. Provide security glazing in thicknesses as needed to comply with requirements indicated.
- B. Fire-Test-Response Characteristics of Plastic Sheets: As determined by testing plastic sheets identical to those used in security glazing products by a qualified testing agency acceptable to authorities having jurisdiction.
1. Self-ignition temperature of 650 deg F (343 deg C) or more when tested per ASTM D1929 on plastic sheets in thicknesses indicated for the Work.
  2. Smoke-developed index of 450 or less when tested according to ASTM E84, or smoke density of 75 or less when tested per ASTM D2843 on plastic sheets in thicknesses indicated for the Work.

### 2.02 GLASS PRODUCTS

- A. Float Glass: ASTM C1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

### 2.03 LAMINATED GLASS

- A. Laminated Glass: ASTM C1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
1. Construction: Laminate glass with polyvinyl butyral interlayer or cast-in-place and cured-transparent-resin interlayer to comply with interlayer manufacturer's written recommendations.
  2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
  3. Interlayer Color: As noted on drawings.

### 2.04 GLAZING GASKETS

- A. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned EPDM, silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C509, Type II, black; of profile and hardness required to maintain watertight seal.
1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

### 2.05 GLAZING SEALANTS

- A. General:
1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including security glazing, seals of insulating security glazing and air-gap security glazing, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  2. Suitability: Comply with sealant and security glazing manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
  3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.
  4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 25, Use NT.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Dow Corning Corporation; 799.
    - b. GE Advanced Materials - Silicones; UltraGlaze SSG4000.
    - c. May National Associates, Inc.; Bondaflex Sil 201 FC.
    - d. Polymeric Systems, Inc.; PSI-631.
    - e. Schnee-Morehead, Inc., an ITW company; SM5731 Poly-Glaze Plus.
    - f. Tremco Incorporated; Proglaze SSG.

2.06 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and security glazing manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:
1. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
1. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.07 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of security glazing and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by security glazing manufacturer to maintain security glazing lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit security glazing lateral movement (side walking).

2.08 FABRICATION OF SECURITY GLAZING

- A. Fabricate security glazing in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

2.09 SECURITY GLASS TYPE:

- A. To insure quality the types of glass that note a specific manufacturer shall be supplied by that manufacturer unless an addendum is issued with another manufacturer's product listed. Other approved manufacturers may submit the applicable tests as shown below for the architect's review in order to be approved.
1. Basis of Design: SGG – School Guard Glass; SG4 Laminated Security Glass; tinted and clear as noted in door glazing and window types on drawings.
  2. 3/8 inch laminated glass: Tinted float glass on exterior, security core, glass-clad polycarbonate on interior.
    - a. Standard Flat Glass: ASTM C1036.
    - b. Laminated Flat Glass: ASTM C1172.

3. Factory assembled low-E, argon filled insulated unit.
4. Attack Rating: 5-aal rated for 6 minutes.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Examine framing for security glazing, with Installer present, for compliance with the following:
  1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
  2. Presence and functioning of weep system.
  3. Minimum required face or edge clearances.
  4. Effective sealing between joints of framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.02 PREPARATION

- A. Clean glazing channels and other framing members receiving security glazing immediately before glazing. Remove coatings not firmly bonded to substrates.

#### 3.03 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of security glazing, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect edges of security glazing from damage during handling and installation. Remove damaged security glazing from Project site and legally dispose of off Project site. Damaged security glazing includes units with edge or face damage or other imperfections that, when installed, could weaken security glazing, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications unless otherwise required by glazing unit manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by security glazing manufacturers for installing lites.
- F. Provide spacers for security glazing lites where the length plus width is larger than 50 inches(1270 mm).
  1. Locate spacers directly opposite each other on both inside and outside faces of security glazing. Install correct size and spacing to preserve required face clearances unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with performance requirements.
  2. Provide 1/8-inch (3-mm) minimum bite of spacers on glazing lites and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent security glazing from moving sideways in glazing channel, as recommended in writing by security glazing manufacturer and according to requirements in referenced glazing publications.
- H. Set security glazing in each series with uniform pattern, draw, bow, and similar characteristics.

- I. Set coated security glazing with proper orientation so that coatings face exterior or interior as specified.

3.04 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by security glazing, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until just before each glazing unit is installed.
- F. Center security glazing in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- G. Cut tape back to 1/4" from top of stop for installation of sealant.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.05 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket securely in place between glazing unit and frame or fixed stop, with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center security glazing in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in security glazing. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center security glazing in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in security glazing. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.06 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between security glazing and glazing stops to maintain face clearances and to prevent sealant from extruding into glazing channel and blocking weep systems. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to security glazing and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from security glazing.

3.07 PROTECTION AND CLEANING

- A. Protect exterior security glazing from damage immediately after installation by attaching crossed streamers to framing held away from glazing unit. Do not apply markers to security glazing surfaces. Remove nonpermanent labels, and clean surfaces.
- B. Protect security glazing from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with security glazing, remove substances immediately as recommended in writing by security glazing manufacturer.
- C. Examine security glazing surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by security glazing manufacturer.
- D. Remove and replace security glazing that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, or vandalism during construction period.
- E. Wash security glazing on exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash security glazing as recommended in writing by security glazing manufacturer.

END OF SECTION



PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
  - 1. Fixed, extruded-aluminum louvers.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections.
- B. Section 07 92 00 – Joint Sealants.
- C. Division 23 - Heating, Ventilation and Air Conditioning.

1.03 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

1.04 PERFORMANCE REQUIREMENTS

- A. Wind Loads: Determine loads based on pressures as indicated on Drawings.
- B. Seismic Performance: Provide louvers capable of withstanding the effects of earthquake motions determined according to applicable code requirements.
- C. Thermal Movements: Provide louvers that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, over-stressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
- D. Temperature Change (Range): 120° F (67° C), ambient; 180° F (100° C), material surfaces.
- E. Air-Performance, Water-Penetration, Air-Leakage, and Wind-Driven Rain Ratings: Provide louvers complying with performance requirements indicated, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

1.05 SUBMITTALS

- A. Product Data: For each type of product indicated. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other Work. Show blade profiles, angles, and spacing.
  - 1. For installed louvers and vents indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Color Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For each type of metal finish required.
- E. Qualification Data: For professional engineer.

1.06 QUALITY ASSURANCE

- A. Source Limitations: Obtain louvers and vents through one source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.
- B. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Verify louver openings by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Approved Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Louvers:
    - a. Airline Products Co.
    - b. Airolite Company (The).
    - c. American Warming and Ventilating, Inc.
    - d. Arrow United Industries.
    - e. Carnes Company, Inc.
    - f. Cesco Products.
    - g. Construction Specialties, Inc.
    - h. Dowco Products Group; Safe-Air of Illinois, Inc.
    - i. Greenheck.
    - j. Industrial Louvers, Inc.
    - k. Louvers & Dampers, Inc.
    - l. Metal Form Manufacturing Company, Inc.
    - m. NCA Manufacturing, Inc.
    - n. Nystrom Building Products.
    - o. Reliable Products; Hart & Cooley, Inc.
    - p. Ruskin Company; Tomkins PLC.
    - q. Vent Products Company, Inc.
    - r. Substitutions: Per Section 01 25 00 – Substitution Procedures.

2.02 MATERIALS

- A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy 6063-T5 or T-52.
- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Aluminum Castings: ASTM B 26/B 26M, alloy 319.
- D. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 (Z275) zinc coating, mill phosphatized.
- E. Fasteners: Of same basic metal and alloy as fastened metal or 300 Series stainless steel, unless otherwise indicated. Do not use metals that are incompatible with joined materials.
  - 1. Use types and sizes to suit unit installation conditions.
  - 2. Use screws for exposed fasteners, unless otherwise indicated.
- F. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, made from stainless-steel components, with capability to sustain, without failure, a load equal to 4 times the loads imposed,

for concrete, or 6 times the load imposed, for masonry, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

- G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

## 2.03 FABRICATION, GENERAL

- A. Assemble louvers in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
1. Vertical Assemblies: Where height of louver units exceeds fabrication and handling limitations, fabricate units to permit field-bolted assembly with close-fitting joints in jambs and mullions, reinforced with splice plates.
  2. Continuous Vertical Assemblies: Fabricate units without interrupting blade-spacing pattern.
- B. Maintain equal louver blade spacing to produce uniform appearance.
- C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
- D. Include supports, anchorages, and accessories required for complete assembly.

## 2.04 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal Storm-Resistant Louver: As noted on Mechanical drawings.

## 2.05 LOUVER SCREENING

- A. General: Provide screen at each exterior louver.
1. Screen Location for Fixed Louvers: Interior face.
  2. Screening Type: Insect screening.
- B. Secure screens to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches (150 mm) from each corner and at 12 inches (300 mm) o.c.
- C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.
1. Metal: Same kind and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.
  2. Finish: Same finish as louver frames to which louver screens are attached.
- D. Louver Screening for Aluminum Louvers:
1. Insect Screening: Aluminum, 18 by 16 (1.4 by 1.6 mm) mesh, 0.012 inch (0.30 mm) wire.

## 2.06 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish louvers after assembly.

## 2.07 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with system established by the Aluminum Association for designating aluminum finishes.
- B. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611. Retain one color below with color anodic finish above.

1. Color: Match Architect's sample.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
  1. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.02 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

#### 3.03 INSTALLATION

- A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.
- F. Protect galvanized and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.
- G. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Division 7 Section "Joint Sealants" for sealants applied during louver installation.

#### 3.04 ADJUSTING AND CLEANING

- A. Clean exposed surfaces of louvers and vents that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers and vents damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.
- D. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, finish coating.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Metal channel ceiling framing.
- D. Acoustic insulation.
- E. Backing board for wet areas.
- F. Gypsum wallboard.
- G. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.
- B. Section 07 21 00 - Thermal Insulation: Acoustic insulation.
- C. Section 07 92 00 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

1.03 REFERENCE STANDARDS

- A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.
- C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- D. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- E. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014, with Editorial Revision (2015).
- F. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2017.
- G. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2017a.
- H. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.
- I. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2016.
- J. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- K. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2013.
- L. ASTM C1288 - Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets; 2017.
- M. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.
- N. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2018.
- O. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2013.

- P. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- Q. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
- R. ASTM E413 - Classification for Rating Sound Insulation; 2016.
- S. GA-216 - Application and Finishing of Gypsum Panel Products; 2016.
- T. GA-600 - Fire Resistance Design Manual; 2015.
- U. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- V. UL (FRD) - Fire Resistance Directory; Current Edition.

#### 1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.
- C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

#### 1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum five years of documented experience.
- B. Copies of Documents at Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

### PART 2 PRODUCTS

#### 2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
  - 1. See PART 3 for finishing requirements.
- B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
  - 1. Acoustic Attenuation: STC of 45-49 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- C. Shaft Walls at HVAC Shafts: Provide completed assemblies with the following characteristics:
  - 1. Air Pressure Within Shaft: Sustained loads of 5 lbf/sq ft with maximum mid-span deflection of L/240.
  - 2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- D. Fire Rated Assemblies: Provide completed assemblies as noted on drawings.

#### 2.02 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
  - 1. Clarkwestern Dietrich Building Systems LLC: [www.clarkdietrich.com](http://www.clarkdietrich.com).
  - 2. Marino: [www.marinoware.com](http://www.marinoware.com).
  - 3. Substitutions: 01 25 00 - Substitution Procedures.
- B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
  - 1. Studs: "C" shaped with flat or formed webs with knurled faces.

2. Runners: U shaped, sized to match studs.
3. Ceiling Channels: C-shaped.
4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
5. Resilient Furring Channels: 1/2 inch depth, for attachment to substrate through both legs; both legs expanded metal mesh.
  - a. Products:
    - 1) Same manufacturer as other framing materials.

- C. Exterior Non-Loadbearing Studs and Furring for Application of Gypsum Board: As specified in Section 09 22 16.
- D. Loadbearing Studs for Application of Gypsum Board: As specified in Section 05 40 00.
- E. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.
  1. Products:
    - a. Same manufacturer as other framing materials.
    - b. Substitutions: 01 25 00 - Substitution Procedures.
- F. Area Separation Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with specified performance requirements.
  1. Products:
    - a. Phillips Manufacturing Co; Hemmed H-Stud: [www.phillipsmfg.com](http://www.phillipsmfg.com).
    - b. Substitutions: 01 25 00 - Substitution Procedures.
- G. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
- H. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
  1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
  2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot dipped galvanized coating.
  3. Provide components UL-listed for use in UL-listed fire-rated head of partition joint systems indicated on drawings.
  4. Deflection and Firestop Track:
    - a. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-rating of the wall assembly.
    - b. Products:
      - 1) FireTrak Corporation; Posi Klip.
      - 2) Metal-Lite, Inc; The System.
      - 3) Substitutions: 01 25 00 - Substitution Procedures.
  5. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 12 feet.
- I. Preformed Top Track Firestop Seal:
  1. Provide components UL-listed for use in UL-listed fire-rated head of partition joint systems specified in Section 07 84 00.

## 2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
  1. Georgia-Pacific Gypsum: [www.gpgypsum.com](http://www.gpgypsum.com).
  2. National Gypsum Company: [www.nationalgypsum.com](http://www.nationalgypsum.com).
  3. USG Corporation: [www.usg.com](http://www.usg.com).
  4. Substitutions: 01 25 00 - Substitution Procedures.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
  1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.

2. Glass mat faced gypsum panels as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
  3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
    - a. Mold resistant board is required at all wet areas, including restrooms.
  4. Thickness:
    - a. Vertical Surfaces: 5/8 inch.
    - b. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
- C. Abuse Resistant Wallboard:
1. Application: High-traffic areas indicated.
  2. Surface Abrasion: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
  3. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
  4. Soft Body Impact: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
  5. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  6. Paper-Faced Type: Gypsum wallboard as defined in ASTM C1396/C1396M.
  7. Type: Fire resistance rated Type X, UL or WH listed.
  8. Thickness: 5/8 inch.
  9. Edges: Tapered.
  10. Products:
    - a. American Gypsum Company; M-Bloc AR Type X.
    - b. Continental Building Products; Protecta AR 100 Type X with Mold Defense.
    - c. Continental Building Products; Rapid Deco Level 5 Type X with Protecta.
    - d. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold Guard Abuse-Resistant.
    - e. National Gypsum Company; Gold Bond Hi-Abuse XP Gypsum Board.
    - f. Substitutions: 01 25 00 - Substitution Procedures.
- D. Impact Resistant Wallboard:
1. Application: High-traffic areas indicated.
  2. Surface Abrasion: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
  3. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
  4. Soft Body Impact: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
  5. Hard Body Impact: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
  6. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  7. Paper-Faced Type: Gypsum wallboard as defined in ASTM C1396/C1396M.
  8. Type: Fire resistance rated Type X, UL or WH listed.
  9. Thickness: 5/8 inch.
  10. Edges: Tapered.
  11. Products:
    - a. American Gypsum Company; M-Bloc IR Type X.
    - b. Continental Building Products; Protecta HIR 300 Type X with Mold Defense.
    - c. National Gypsum Company; Gold Bond HI-Impact XP Gypsum Board.
    - d. Substitutions: 01 25 00 - Substitution Procedures.
- E. Backing Board For Wet Areas:
1. Application: Surfaces behind tile in wet areas including shower surrounds and shower ceilings.
  2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  3. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
    - a. Thickness: 1/2 inch.
    - b. Products:
      - 1) Basis of Design: National Gypsum Company; Purple XP Drywall; [www.nationalgypsum.com](http://www.nationalgypsum.com).
      - 2) USG Corporation: [www.usg.com](http://www.usg.com).
      - 3) Substitutions: Per Section 01 25 00 – Substitution Procedures.
- F. Backing Board For Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
1. Application: Vertical surfaces behind thinset tile, except in wet areas.

2. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
3. Type: Regular and Type X, in locations indicated.
4. Type X Thickness: 5/8 inch.
5. Regular Board Thickness: 1/2 inch.
6. Edges: Tapered.
7. Products:
  - a. American Gypsum Company; M-Bloc.
  - b. American Gypsum Company; M-Bloc Type X.
  - c. Georgia-Pacific Gypsum; ToughRock Mold-Guard Gypsum Board.
  - d. Georgia-Pacific Gypsum; DensArmor Plus.
  - e. National Gypsum Company; Gold Bond XP Gypsum Board.
  - f. Substitutions: 01 25 00 - Substitution Procedures.

G. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.

1. Application: Ceilings, unless otherwise indicated.
2. Thickness: 1/2 inch.
3. Edges: Tapered.
4. Products:
  - a. Continental Building Products; Sagcheck.
  - b. Georgia-Pacific Gypsum; ToughRock Span 24 Ceiling Board.
  - c. Substitutions: 01 25 00 - Substitution Procedures.

H. Acoustical Sound Dampening Wall and Ceiling Board: Two layers of heavy paper faced, high density gypsum board separated by a viscoelastic polymer layer and capable of achieving STC rating of 50 or more in typical stud wall assemblies as calculated in accordance with ASTM E413 and when tested in accordance with ASTM E90.

1. Thickness: 1/2 inch.
2. Long Edges: Tapered.
3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
4. Products:
  - a. National Gypsum Company; Gold Bond SoundBreak XP Gypsum Board: [www.nationalgypsum.com](http://www.nationalgypsum.com).
  - b. Substitutions: 01 25 00 - Substitution Procedures.

I. Exterior Sheathing Board: As specified in Section 06 10 00.

J. Exterior Soffit Board: Exterior gypsum soffit board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.

1. Application: Ceilings and soffits in protected exterior areas, unless otherwise indicated.
2. Edges: Tapered.

K. Shaftwall and Coreboard: Type X; 1 inch thick by 24 inches wide, beveled long edges, ends square cut.

1. Paper Faced Type: Gypsum shaftliner board or gypsum coreboard as defined ASTM C1396/C1396M; water-resistant faces.
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
3. Products:
  - a. American Gypsum Company; M-Bloc Shaft Liner.
  - b. American Gypsum Company; Shaft Liner.
  - c. Georgia-Pacific Gypsum; ToughRock Shaftliner.
  - d. National Gypsum Company; Gold Bond Fire-Shield Shaftliner XP.
  - e. Substitutions: 01 25 00 - Substitution Procedures.

2.04 ACCESSORIES

A. Acoustic Insulation: As specified in Section 07 21 00.

B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.

1. Products:

- a. Franklin International, Inc; Titebond GREENchoice Professional Acoustical Smoke and Sound Sealant: [www.titebond.com](http://www.titebond.com).
  - b. Liquid Nails, a brand of PPG Architectural Coatings; AS-825 Acoustical Sound Sealant: [www.liquidnails.com](http://www.liquidnails.com).
  - c. Substitutions: 01 25 00 - Substitution Procedures.
- C. Water-Resistive Barrier: As specified in Section 07 27 26.
- D. Finishing Accessories: ASTM C1047, galvanized steel, rolled zinc, or rigid plastic, unless noted otherwise.
- 1. Types: As detailed or required for finished appearance.
  - 2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.
  - 3. Products:
    - a. Same manufacturer as gypsum board materials.
    - b. Substitutions: 01 25 00 - Substitution Procedures.
- E. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.
- F. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
- 1. Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
  - 2. Chemical hardening type compound.
- G. High Build Drywall Surfer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.
- H. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.
- I. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

#### 3.02 SHAFT WALL INSTALLATION

- A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
  - 1. Install studs at spacing required to meet performance requirements.
- B. Shaft Wall Liner: Cut panels to accurate dimension and install sequentially between special friction studs.

#### 3.03 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
- C. Studs: Space studs at 16 inches on center.
  - 1. Extend partition framing to structure where indicated and to ceiling in other locations.
  - 2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
  - 3. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

- E. Standard Wall Furring: Install at concrete walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
- F. Acoustic Furring: Install resilient channels at maximum 24 inches on center. Locate joints over framing members.
- G. Blocking: Install wood blocking for support of:
  - 1. Framed openings.
  - 2. Wall mounted cabinets.
  - 3. Plumbing fixtures.
  - 4. Toilet partitions.
  - 5. Toilet accessories.
  - 6. Wall mounted door hardware.

### 3.04 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install as follows:
  - 1. Place one bead continuously on substrate before installation of perimeter framing members.
  - 2. Place continuous bead at perimeter of each layer of gypsum board.
  - 3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

### 3.05 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- C. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of non-rated double-layer assemblies, which may be installed by means of adhesive lamination.

### 3.06 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

### 3.07 JOINT TREATMENT

- A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, bedded and finished with chemical hardening type joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
  - 1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
  - 2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
  - 3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
  - 4. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
  - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
- D. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.08 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

- A Suspended acoustical grid and tile.

1.02 GENERAL

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 SUBMITTALS

- A Submit shop drawings.
- B Submit samples of tile and sections of suspension system.

PART 2 PRODUCTS

2.01 MATERIALS

- A Tile shall be the following:
1. Ultima Beveled Tegular by Armstrong; [www.armstrongceilings.com](http://www.armstrongceilings.com).
  2. Ultima High NRC Tegular by Armstrong; [www.armstrongceilings.com](http://www.armstrongceilings.com).
  3. Canyon Tegular by Armstrong; [www.armstrongceilings.com](http://www.armstrongceilings.com).
  4. Kitchen Zone Square Lay-In by Armstrong; [www.armstrongceilings.com](http://www.armstrongceilings.com).
- B Suspension system shall be the following:
1. Metal: Electro-galvanized steel 0.015 inch thick x 1-1/2 inch high x 15/16 inch face.
  2. Color: White
- C Hanger Wire: Provide not less than 12 gauge galvanized carbon steel ASTM A641, soft temper.
- D Edge Moldings and trim: Manufacturer's standard metal of types and profiles required for all applications encountered. Fabricate to fit all penetrations exactly.
- E Drop ceiling trim shall be "Axiom" trim as manufactured by Armstrong or Architect-approved substitute.
- F Ceiling tile hold down clips shall be similar and equal to Donn Q-1 for use as required at Fire rated assemblies and at entries as shown on the drawings.
- G Plastic grid clips shall be similar and equal to Part # 107015 as manufactured by K International, Inc., 3982 Ryan Rd., Gurnee, IL 60031, 800-323-2389. Provide a minimum of eight (8) for each room designated as an "E" occupancy on the Life Safety drawing. Provide a minimum of four (4) for each room designated as a "B" occupancy on the Life Safety drawing.

PART 3 EXECUTION

3.01 INSTALLATION

- A Installation shall be by distributor authorized by the manufacturer of the tile in accordance with published recommendations and approved drawings. Provide all edge moldings, clips and related accessories.

- B Cooperate and coordinate installation with electrical and mechanical trades, regarding light fixtures, diffusers, and other equipment.
- C Install systems in compliance with ASTM C636, governing regulations and fire-resistance requirements. Support hangers only from structural members. Locate hangers not less than 6 inches from each end and spaced 4 feet on center along main runner. Level to within 1/8 inch in 12 feet. Limit deflection to 1/360 of span length in inches.
- D Install hangers plumb and free from contact with objects which are not part of structural or ceiling system. Wire connections shall be capable of supporting a 100 pound allowable load.
- E Provide main runners continuous in line with each side of recessed lights. Entire suspension system shall be completely connected forming a homogeneous frame. Independent/unattached fields are prohibited.
- F Provide trim and moldings as required to conceal edges of acoustic tiles.
- G Install panels to fit accurately at borders and penetrations.
- H Suspended ceiling system shall not be used to support ductwork, piping, insulation, etc.

### 3.02 ADDITIONAL INSTALLATION REQUIREMENTS

- A General: Comply with requirements of authority having jurisdiction in the respective seismic zone.
- B Individual light fixtures or other attachments to the ceiling system, with a combined weight of 56 pounds or less shall have two 12 gauge wire hangers attached, with slack, at diagonal corners of the fixture to prevent drop out.
- C Any fixture or attachment weighing more than 56 pounds must be independently supported from the structure.
- D The minimum connection strength for main and cross runner intersection/splices shall be 60 pounds. In compression and tension (must allow 5 degree offset in any direction).
  - 1. Ceiling system actual weight, including grid, panel, light fixtures and air terminals to be 2.5 pounds per sq. ft. or less. All other services shall be independently supported from the structure.
- E The ceiling system cannot be used to provide lateral support for walls or partitions.
- F Perimeter closure angles must provide a min 7/8 inch support ledge. Terminal ends of grid or tile must rest on ledge with min 3/8 inch clearance from wall:
  - 1. For support ledges smaller than 7/8 inch, terminal ends of cross or main runners shall be independently supported within 8 inches from each wall or ceiling discontinuity. This support must prevent grid from falling. This support should not be out of plumb greater than 1 in 6. Maintain 3/8 inch end clearance from wall.
  - 2. All penetrations (i.e. columns, sprinklers, etc.) and independently supported fixtures are considered perimeter closures that must allow noted clearances.
- G At wall Closure ledges, cross and main runners must be prevented from spreading apart. Permanent attachment for grid alignment purposes is prohibited.

3.03 ADJUST AND CLEAN

- A Clean exposed surfaces of panels, moldings, and trim. Remove and replace work which cannot be cleaned to permanently eliminate evidence of damage.

3.04 ATTIC STOCK

- A Contractor shall furnish 5% extra ceiling tile for each type used in this project.
- B Extra tile shall be packaged and marked as to type and furnished to the Owner at the completion of the project.

3.05 CLEAN-UP

- A Remove all debris after tile work is complete in each space.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Acoustical wood ceilings.
- B. Exposed grid suspension system.
- C. Wire hangers, fasteners, main runners, cross tees, wall angle moldings and accessories.

1.02 RELATED SECTIONS

- A. Drawings and general conditions of Contract, including General and Supplementary Conditions and Division 01 Specification sections apply to work of this section.
- B. Section 09 21 16 – Gypsum Board Assemblies
- C. Division 23 - HVAC
- D. Division 26 - Electrical

1.03 ALTERNATES

- A. Prior Approval: Unless otherwise provided for in the Contract documents, submit proposed product substitutions no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review and acceptance. Approved products will be set forth by the Addenda. If a substitution is included in a Bid and is not approved by an Addendum, the specified products shall be provided as in place of the substitute without additional compensation.
- B. Submittals which do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); panel design, size, composition, color, and finish; suspension system component profiles and sizes; compliance with the referenced standards.

1.04 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM):
  - 1. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
  - 2. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot- Dip Process.
  - 3. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
  - 4. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
  - 5. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 6. ASTM E 580 Application of Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels in Areas Requiring Seismic Restraint.
  - 7. ASTM E 1264 Classification for Acoustical Ceiling Products.
- B. Hardwood Plywood & Veneer Association (HPVA)
- C. International Building Code
- D. ASHRAE Standard 62 1 2004 Ventilation for Acceptable Indoor Air Quality

E. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components

F. International Code Council-Evaluation Services Report - Seismic Engineer Report  
1. ESR 1308 - Armstrong T-Bar or Dimensional Suspension

#### 1.05 SUBMITTALS

A. Shop Drawings: Layout and details of ceilings. Show locations of items that are to be coordinated with or supported by the ceilings.

B. Installation Instructions: Submit manufacturer's installation instructions as referenced in Part three, Installation.

C. Product Data: Submit manufacturer's technical data for each type of ceiling unit and suspension system required.

D. Samples: Real Wood Veneer on fire rated particle board – Semi-gloss tinted topcoat – Clear Finish

E. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.

F. Non-Conformance: All products not conforming to the requirements of this specification and or the manufacturer's published values are to be disposed. The Contractor performing the work will replace with approved product at their expense.

#### 1.06 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide ceiling panel units and grid components by a single manufacturer.

B. Fire Performance Characteristics: Identify ceiling components with appropriate markings of applicable testing and inspecting organization.

1. Surface Burning Characteristics: As follows, tested per ASTM E-84 and complying with ASTM E 1264 for Class A products.
2. HPVA (Hardwood Plywood and Veneer Association) certification and audit program per ASTM E-84 tunnel test.

C. Woodworking Standards: Manufacturer must comply with specified provisions of Architectural Woodworking Institute quality standards.

D. Coordination of Work: Coordinate ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

#### 1.07 DELIVERY, STORAGE, AND HANDLING

A. Store ceiling components in a dry interior location in their cartons prior to installation to avoid damage. Store cartons in a flat, horizontal position. The protectors between the panels should not be removed until installation.

B. Do not store in unconditioned spaces with humidity greater than 55 percent or lower than 25 percent relative humidity and temperatures lower than 50 degrees F or greater than 86 degrees F. Panels must not be exposed to extreme temperatures, for example, close to a heating source or near a window with direct sunlight.

C. Handle ceiling units carefully to avoid chipped edges or damage to units in any way.

1.08 PROJECT CONDITIONS

- A. Wood ceiling materials should be permitted to reach room temperature and have a stabilized moisture content for a minimum of 72 hours before installation. (Remove plastic wrap to allow panels to climatize).
- B. The wood panels should not be installed in spaces where the temperature or humidity conditions vary from the temperatures and conditions that will be normal in the occupied space.
- C. As interior finish products, the veneered panels are designed for installation in temperature conditions between 50 degrees F and 86 degrees F, in spaces where the building is enclosed, and HVAC systems are functioning and will be in continuous operation. Relative humidity should not fall below 25 percent or exceed 55 percent.

1.09 WARRANTY

- A. Veneered Wood Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to:
  - 1. Veneered Wood Panels: Defects in materials or factory workmanship.
  - 2. Grid System: Rusting and manufacturing defects.
- B. Warranty Period:
  - 1. Veneered Wood panels: One (1) year from date of installation.
  - 2. Grid: Ten years from date of installation.
- C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.10 MAINTENANCE

- A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.
  - 1. Ceiling Units: Furnish quality of full-size units equal to 2.0 percent of amount installed.
  - 2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 1.0 percent of amount installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: WoodWorks Linear Veneered Open by Armstrong World Industries, Inc.
- B. Suspension System by same manufacturer as acoustical wood ceiling panel.
- C. Substitutions: See Section 01 25 00 – Substitution Procedures.

2.02 WOOD CEILING UNITS

- A. Ceiling Panels:
  - 1. Surface Texture: Smooth
  - 2. Composition: Real wood veneer on fire rated particle board
  - 3. Finish(s): Real Wood Veneer
    - a. Rift White Oak (NRO)
  - 4. Panel Width Size(s): With 3/4" reveal Plank to Plank @ Width
    - a. 4-inch (O.C.): 3-3/4-inch Plank Width (Actual)
  - 5. Panel Length Size(s): With no reveal @ Length
    - a. 96-inch (Actual)

6. Flame Spread:
    - a. Class A: ASTM E84 surface burning characteristics. Flame Spread Index 25 or less.  
Smoke Developed Index 50 or less.
  - B. Accessories:
    1. Backer Clip - Item 5687
    2. Tee Bar Hook – Item 5986
    3. Wood Screws – Item 7123PKG300
    4. Safety Cable – Item 6091
    5. Support Hanger – Item SH12
    6. Beam End Retaining Clip – Item BERC2
    7. Grid Tee Snap-in Clip – Item 5373
- 2.03 SUSPENSION SYSTEMS
- A. Components: All main beams and cross tees shall be commercial quality hot dipped galvanized steel as per ASTM A653. Main beams and cross tees are double-web steel construction with 15/16-inch type exposed flange design. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.
    1. Structural Classification: ASTM C635 (Heavy Duty)
    2. Color: Tech Black.
    3. Acceptable Product: 12' HD Linear Carriers for 4-1/2" modules 5370, 12' HD Linear Carriers for 6" modules 5371, Prelude XL 2' Cross Tee XL7328BL (for discontinuous/cloud applications) as manufactured by Armstrong World Industries, Inc.
    4. 12-Gauge Hanger Wire – Item 7891
  - B. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
  - C. Wire for Hangers and Ties: ASTM A641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least times-three design load, but not less than 12 gauge.
  - D. Accessories/Edge Moldings and Perimeter Trim:
    1. Shadow Molding (seismic) - Item 7823
    2. Angle Molding – Item 7805
    3. Grid Tee Snap-In Clip – Item 5373
    4. 4" Veneered Trim with 4 Clips – item 6481F07W1H4NRO - W/Real Wood Edgebanding
    5. Axiom Slip Joint - AXSJ
    6. Replacement Trim Clip – Item 5925
    7. Adjustable Trim Clip – Item 7239
    8. Axiom Classic Curved Perimeter Trim – Silver Grey – 4" – AX4CURSG.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out.
- B. Proper designs for both supply air and return air, maintenance of the HVAC filters and building interior space are essential to minimize soiling. Before starting the HVAC system, make sure supply air is properly filtered and the building interior is free of construction dust.

3.02 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.
- B. Ceiling materials should be permitted to reach room temperature and have a stabilized moisture content for a minimum of 72 hours before installation. Remove plastic wrap to allow panels to climatize.

3.03 INSTALLATION

- A. Veneered wood panels are designed for installation in temperature conditions between 50 degrees F and 86 degrees F, in spaces where the building is enclosed, and HVAC systems are functioning and will be in continuous operation. Relative humidity should not fall below 25 percent or exceed 55 percent.
- B. Install suspension system and panels in compliance with ASTM C636, ASTM E580, with the approval of the authorities having jurisdiction, and in accordance with the manufacturer's written installation instructions.

3.04 ADJUSTING AND CLEANING

- A. Replace damaged and broken panels.
- B. Clean exposed surfaces of ceilings panels, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage.

END OF SECTION



PART 1 GENERAL

1.01 SCOPE

- A Furnish all labor, materials, equipment and supervision to provide and install multipurpose gymnasium sports flooring where indicated on the drawings and as specified herein.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 PROJECT CONDITIONS

- A The building shall be dry and enclosed with the permanent HVAC system installed and operational. Maintain 70° F. minimum temperature in room for 48 hours prior to installation, during installation, and 48 hours after installation. Maintain a minimum temperature of 55° F. thereafter.
- B The installer shall be familiar with the existing subfloor conditions.
- C All work which will cause damage, dirt, dust or interruption to the install shall be completed one week prior.
- D The installation area shall be closed to all traffic and activity for a period to be set by the flooring contractor.

1.04 QUALITY ASSURANCE

- A Installation shall be by experienced and skilled mechanics, in accordance with the flooring manufacturer's latest printed instructions.
- B Coordinate the requirements of floor adhesives and concrete finishing to assure compatibility between flooring adhesive and finish of concrete slab.

1.05 SUBMITTALS

- A Submit product data, certificates, and maintenance data in accordance with Section 013300. Submit the following:
  - 1. Product data: For each type of product specified.
  - 2. Samples for Selection: In manufacturer's standard size for each pattern of floor covering specified, showing full range of variations expected in color and pattern.
  - 3. Maintenance Data: For sheet vinyl floor coverings to include in maintenance manuals specified in Division 1.

1.06 WARRANTY

- A As provided by the Manufacturer on flooring and accessories for a period of two (2) years.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A Resilient flooring shall be Taraflex Sport M Plus flooring by Gerflor; [www.gerflorusa.com](http://www.gerflorusa.com).
1. Taraflex flooring is shipped in rolls, roughly 4'-11" x 65'-6" x 0.28".
- B Base shall be Thermoset vulcanized Rubber Base manufactured from 100% virgin synthetic rubber, as manufactured by Johnsonite, Flexco Roppe, or approved substitute. Provide 1/8" gauge set-on straight base 4 inches high at carpeted floors unless noted otherwise on the drawings. Provide 1/8" gauge set-on cove type, 4 inches high at all other floor surfaces where rubber base is scheduled. Provide base in 120 foot rolls. Colors to be selected by the Architect.
- C Adhesive for installing resilient flooring shall be types specified by the flooring manufacturer. Adhesive for installing vinyl base shall be in accordance with manufacturer's written instructions.
- D Provide and install preformed base corners at all inside and outside corners.

## PART 3 EXECUTION

### 3.01 INSPECTION

- A The Flooring Contractor shall inspect floor substrate to receive vinyl flooring prior to beginning work and shall bring any deficiencies, which would prevent him from producing an acceptable installation to the attention of the Architect and the General Contractor. He shall not proceed until the deficiencies are corrected. In no case shall the correction of deficiencies in the subfloor, required for successful tile installation, be cause for additional charges to the Owner. In any event, start of vinyl tile work shall be construed by the Architect as acceptance by the Contractor, of the substrate for proper installation.

### 3.02 PREPARATION OF SURFACES

- A Sweep or brush all surfaces clean of dust and foreign material and be sure that all surface irregularities have been corrected before resilient material is installed. Fill all voids to assure a smooth and solid anchorage of the tile.

### 3.03 INSTALLATION

- A Lay vinyl tiles so as to insure good contact, with close even joints and with all finished surfaces in a true plane, smooth, and with veining in tile all laid in the same direction. Tile joints shall be continuous in one direction only and shall alternate at the mid-point of the adjacent tile in the other direction. Tiles shall be laid square with axis of room with widths of tiles at all sides as nearly even as possible, in no case less than 1/2 tile.
- B It is intended that all sub-floors on which vinyl work is laid shall be smooth and level. The Contractor shall, however, provide approved "underlayment", recommended and guaranteed by tile manufacturer for specific purpose, for filling small cracks and irregularities, as job conditions require.
- C Lay all vinyl flooring strictly as per manufacturer's printed specifications for particular material and type of tile.
- D Install vinyl plastic edging strip with rounded or tapered edge where resilient floor terminates at points higher than contiguous finished flooring.
- E Install feature strips where tile pattern offsets.

F Install rubber base around the base of all fixed base cabinets.

G Install edge trim in accordance with manufacturer's directions.

### 3.04 CLEANING AND PROTECTION

A Perform the following operations immediately after installing resilient products:

1. Remove and replace all damaged, defective, scratched, and discolored tile.
2. Remove adhesive and other surface blemishes using cleaner recommended by the resilient product manufacturers.
3. Sweep or vacuum floor thoroughly.
4. Do not wash floor until after time period recommended by flooring manufacturer.
5. Damp-mop floor to remove marks and soil.
6. After time recommended by the manufacturer, apply protective floor polish to floor surfaces that are free from soil, visible adhesive, and surface blemishes. Coordinate selection of floor polish with Owner's maintenance service.

B Cover installed flooring with undyed, untreated building paper until inspection for final completion.

C Not more than 4 days before date scheduled for final inspection, clean flooring according to manufacturer's recommendations. Strip protective floor polish that was applied after completing installation only if required to restore polish finish and if recommended by flooring manufacturer. After cleaning, reapply polish to floor surfaces to restore protective floor finish and buff according to flooring manufacturer's written recommendations

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A Resilient tile flooring and rubber base.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 PROJECT CONDITIONS

- A Maintain 70° F. minimum temperature in room for 48 hours prior to installation, during installation, and 48 hours after installation. Maintain a minimum temperature of 55° F. thereafter.

1.04 QUALITY ASSURANCE

- A Comply with the provisions of the current editions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified.

1. ASTM F – 1869 Test Method for Measuring Vapor Emission Rate of Concrete Subfloors Using Anhydrous Calcium Chloride.

- B Coordinate the requirements of floor adhesives and concrete finishing to assure compatibility between flooring adhesive and finish of concrete slab.

1. Employ at Contractor's expense a testing laboratory to perform moisture testing on concrete slabs scheduled to receive resilient flooring at a rate of one test per 2000 sq.ft. prior to installation of finish flooring.
2. Floors to receive resilient flooring shall limit moisture vapor emission to not more than 3 pounds per 1,000 sq.ft. per 24 hours, in compliance with RMA Moisture Test Unit.

- C Installation shall be by experienced and skilled mechanics, in accordance with the flooring manufacturer's latest printed instructions.

- D Coordinate the requirements of floor adhesives and concrete finishing to assure compatibility between flooring adhesive and finish of concrete slab.

1.05 SUBMITTALS

- A Submit product data, certificates, and maintenance data in accordance with Section 01300. Submit the following:

1. Product data: For each type of product specified.
2. Samples for Selection: In manufacturer's standard size for each pattern of floor covering specified, showing full range of variations expected in color and pattern.
3. Maintenance Data: For sheet vinyl floor coverings to include in maintenance manuals specified in Division 1.

1.06 GUARANTEE

- A Furnish to the Architect a written guarantee that all work required by this section will be free from defects of materials and workmanship for a period of one year from date of acceptance of the work by the Architect.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A Resilient flooring shall be as indicated on the drawings.
- B Cove Base shall be as indicated on the drawings.
- C Adhesive for installing resilient flooring shall be types specified by the flooring manufacturer. Adhesive for installing base shall be in accordance with manufacturer's written instructions.
- D Tapered edging strips for vinyl flooring termination shall be 1/8" thick by 1" wide, vinyl with tapered or rounded edge.
- E Provide and install preformed base corners at all inside and outside corners.

## PART 3 EXECUTION

### 3.01 INSPECTION

- A The Flooring Contractor shall inspect floor substrate to receive vinyl flooring prior to beginning work and shall bring any deficiencies, which would prevent him from producing an acceptable installation to the attention of the Architect and the General Contractor. He shall not proceed until the deficiencies are corrected. In no case shall the correction of deficiencies in the subfloor, required for successful installation, be cause for additional charges to the Owner. In any event, start of flooring work shall be construed by the Architect as acceptance by the Contractor, of the substrate for proper installation.

### 3.02 PREPARATION OF SURFACES

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
- C. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
- D. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- E. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
- F. Moisture Testing: Perform tests specified or as recommended by the manufacturer if more stringent controls are required. Submit test results to Architect for review. Proceed with installation only after substrates pass testing.
- G. Scrub concrete subfloor with a rotary buffer with a 100 -150 grit abrasive screen over a 1" white nylon maintenance pad.
- H. Sweep or brush all surfaces clean of dust and foreign material and be sure that all surface irregularities have been corrected before resilient material is installed. Fill all voids to assure a smooth and solid anchorage of the flooring.

### 3.03 INSTALLATION

- A Lay vinyl flooring so as to insure good contact, with close even joints and with all finished surfaces in a true plane, smooth, and with veining in tile/plank all laid in the same direction.
- B Joints shall be arranged as shown in the drawings.

1. If not indicated on drawings, joints for any "VCT"/"tile" shall be laid continuous in both directions. Tiles shall be laid square with axis of room with widths of tiles at all sides as nearly even as possible, in no case less than 1/2 tile.
  2. If not indicated on drawings, joints for any "VCP"/"plank" shall be laid continuous on the long side of the planks and staggered in a randomly selected offset in an increment of 12" with no adjacent short joints aligning. Architect shall select general orthogonal direction of the long axis. Planks shall be laid square with axis of room with widths of planks on both "sides" of room/pattern as even as possible and in no case less than 1/2 a plank in the short dimension. Install with no less than four linear inches in the long dimension on both "ends" of room/pattern.
- C It is intended that all sub-floors on which vinyl work is laid shall be smooth and level. The Contractor shall, however, provide approved "underlayment", recommended and guaranteed by flooring manufacturer for specific purpose, for filling small cracks and irregularities, as job conditions require.
- D Lay all vinyl flooring strictly as per manufacturer's printed specifications for particular material and type of tile and/or plank.
- E Install vinyl plastic edging strip with rounded or tapered edge where resilient floor terminates at points higher than contiguous finished flooring.
- F Install feature strips where floor pattern offsets.
- G All flooring to continue under casework and other built-in cabinets.
- H Install edge trim in accordance with manufacturer's directions.
- 3.03 CLEANING AND PROTECTION
- I Perform the following operations immediately after installing resilient products:
1. Remove and replace all damaged, defective, scratched, and discolored tile and/or plank.
  2. Remove adhesive and other surface blemishes using cleaner recommended by the resilient product manufacturers.
  3. Sweep or vacuum floor thoroughly.
  4. Do not wash floor until after time period recommended by flooring manufacturer.
  5. Damp-mop floor to remove marks and soil.
  6. After time recommended by the manufacturer, apply protective floor polish to floor surfaces that are free from soil, visible adhesive, and surface blemishes. Coordinate selection of floor polish with Owner's maintenance service.
- J Cover installed flooring with undyed, untreated building paper until inspection for final completion.
- K Not more than 4 days before date scheduled for final inspection, clean flooring according to manufacturer's recommendations. Strip protective floor polish that was applied after completing installation only if required to restore polish finish and if recommended by flooring manufacturer. After cleaning, reapply polish to floor surfaces to restore protective floor finish and buff according to flooring manufacturer's written recommendations

END OF SECTION



PART 1 - GENERAL

1.01 SUMMARY

- A. Cementitious urethane based resinous flooring system.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required.
- B. Samples for Verification: For each resinous flooring system required, 6 inches (150 mm) square, applied to a rigid backing by Installer for this Project.
- C. Product Schedule: Use resinous flooring designations indicated in Part 2 and room designations indicated on Drawings in product schedule.
- D. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- E. Maintenance Data: For resinous flooring to include in maintenance manuals.

1.04 QUALITY ASSURANCE

- A. No request for substitution shall be considered that would change the generic type of floor system specified (i.e. cementitious based system). Equivalent materials of other manufactures may be substituted only on approval of Architect or Engineer. Request for substitution will only be considered only if submitted 10 days prior to bid date. Request will be subject to specification requirements described in this section.
- B. Installer Qualifications: Engage an experienced installer (applicator) who is experienced in applying resinous flooring systems similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance, and who is acceptable to resinous flooring manufacturer.
1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.
  2. Contractor shall have completed at least 10 projects of similar size and complexity.
- C. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, through one source from a single manufacturer, with not less than ten years of successful experience in manufacturing and installing principal materials described in this section. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.
- D. Manufacturer Field Technical Service Representatives: Resinous flooring manufacture shall retain the services of Field Technical Service Representatives who are trained specifically on installing the system to be used on the project.
1. Field Technical Services Representatives shall be employed by the system manufacture to assist in the quality assurance and quality control process of the installation and shall be available to perform field problem solving issues with the installer.
- E. Mockups: Apply mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Apply full-thickness mockups on 48-inch- (1200-mm-) square floor area selected by Architect. Include 48-inch (1200-mm) length of integral cove base.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
3. Pre-installation Conference: General contractor shall arrange a meeting not less than thirty days prior to starting work. The General Contractor, Architect/Owner's Representative, and Manufacturer/Installer's Representative shall be in attendance.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.
- B. Store materials to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.
- C. All materials used shall be factory pre-weighed and pre-packaged in single, easy to manage batches to eliminate on site mixing errors. No on site weighing or volumetric measurements allowed.

1.06 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.
  1. Maintain material and substrate temperature between 65 and 85 deg F (18 and 30 deg C) during resinous flooring application and for not less than 24 hours after application.
- B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.
- C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.
- D. Concrete substrate shall be properly cured for a minimum of 30 days. A vapor barrier must be present for concrete subfloors on or below grade. Otherwise, an osmotic pressure resistant grout must be installed prior to the resinous flooring

1.07 WARRANTY

- A. Manufacturer shall furnish a single, written warranty covering both material and workmanship for a period of (1) full years from date of installation or provide a joint and several warranty signed on a single document by material manufacturer and applicator jointly and severally warranting the materials and workmanship for a period of (1) full year from date of installation. A sample warranty letter must be included with bid package or bid may be disqualified.

PART 2 - PRODUCTS

2.01 RESINOUS FLOORING

- A. Available Products: Build up broadcast or liquid-rich type systems will not be accepted, and will result in a disqualification from bid. Subject to compliance with requirements, products that may be incorporated into the Work include:
  1. Basis of Design: Dur-A-Flex Accelera HC with Micro Chip as noted on finish schedule; [www.dur-a-flex.com](http://www.dur-a-flex.com).
  2. Additional alternate manufacturers must be approved by Architect prior to bidding.

- B. System Characteristics:
  - 1. Color and Pattern: As indicated on drawings.
  - 2. Integral Cove Base: 4 inches.
  - 3. Overall System Thickness: 1/4"
- C. System Components: Manufacturer's standard components that are compatible with each other and as follows:
  - 1. Base coat with broadcast.
  - 2. Second broadcast coat.
  - 3. Grout coat.
  - 4. Topcoat.

## 2.02 ACCESSORY MATERIALS

- A. Primer: Type recommended by manufacturer for substrate and body coats indicated.
- B. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.
- C. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service and joint condition indicated.
- D. Texture: Type recommended or produced by resinous flooring manufacturer for use with specified topcoat. Degree of texture required by owner to be verified with samples and installed on mock up.

## PART 3 - EXECUTION

### 3.01 PREPARATION

- A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral Ph substrate for resinous flooring application.
- B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
  - 1. Mechanically prepare substrates as follows:
    - a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
    - b. Comply with ASTM C 811 requirements, unless manufacturer's written instructions are more stringent.
  - 2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.
  - 3. Verify that concrete substrates are dry.
    - a. Perform in situ probe test, ASTM F 2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity of 75 percent.
    - b. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate of 7 lb of water/1000 sq. ft. of slab in 24 hours.
    - c. Perform additional moisture tests recommended by manufacturer. Proceed with application only after substrates pass testing.
  - 4. Verify that concrete substrates have neutral Ph and that resinous flooring will adhere to them. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.
- C. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.

- D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
- E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations.

### 3.02 APPLICATION

- A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
  - 1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
  - 2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
  - 3. At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations.
    - a. Apply joint sealant to comply with manufacturer's written recommendations.
- B. Apply primer where required by resinous system, over prepared substrate at manufacturer's recommended spreading rate.
- C. Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, and top-coating of cove base. Round internal and external corners.
  - 1. Integral Cove Base: 4 inches high.
- D. Apply metal trowel single mortar coat in thickness indicated for flooring system. Hand or power trowel and grout to fill voids. When cured, sand to remove trowel marks and roughness.
- E. Apply topcoat(s) in number of coats indicated for flooring system and at spreading rates recommended in writing by manufacturer.

### 3.03 FIELD QUALITY CONTROL

- A. Material Sampling: Owner may at any time and any numbers of times during resinous flooring application require material samples for testing for compliance with requirements.
  - 1. Owner will engage an independent testing agency to take samples of materials being used. Material samples will be taken, identified, sealed, and certified in presence of Contractor.
  - 2. Testing agency will test samples for compliance with requirements, using applicable referenced testing procedures or, if not referenced, using testing procedures listed in manufacturer's product data.
  - 3. If test results show applied materials do not comply with specified requirements, pay for testing, remove noncomplying materials, prepare surfaces coated with unacceptable materials, and reapply flooring materials to comply with requirements.

### 3.04 CLEANING, PROTECTING, AND CURING

- A. Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process. Close area of application for a minimum of 18 hours.
- B. Protect resinous flooring materials from damage and wear during construction operation. Where temporary covering is required for this purpose, comply with manufacturer's recommendations for protective materials and method of application. General Contractor is responsible for protection and cleaning of surfaces after final coats.

- C.      Cleaning: Remove temporary covering and clean resinous flooring just prior to final inspection. Use cleaning materials and procedures recommended by resinous flooring manufacturer

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Walk-off carpet tile.

1.02 RELATED DOCUMENTS

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 SUBMITTALS

- A. Submit data sheets and indicate quantities required on adhesive, and other accessories. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation recommendations for each type of substrate.
- B. Successful bidder, upon request of Architect, shall supply a complete color selection of samples of carpet on which he has based his bid.
- C. Qualification data for proposed installer.
- D. Product Test Reports based on evaluation of comprehensive tests performed by a qualified testing agency.
- E. Maintenance Data for carpet tiles to include maintenance manuals including the following:
  - 1. Method for maintaining carpet tile, including cleaning and stain removal products and procedures and manufacturer's recommended maintenance schedule.
  - 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.
  - 3. Copy of special warranty specified in this section.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.
- B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104, Section 5, "Storage and Handling."

1.06 PROJECT CONDITIONS

- A. Maintain 70° F minimum temperature in room for 48 hours prior to installation, during installation, and 48 hours after installation. Maintain a minimum temperature of 55° F thereafter.
- B. Do not install carpet tile until they are at the same temperature as the space where they are to be installed.
- C. Close spaces to traffic during carpet tile installation, and for a time period after installation recommended in writing by the manufacturer.
- D. Install carpet tile and accessories after other finishing operations, including painting, have been completed.
- E. Do not install carpet over access floors until after floor pedestal adhesives have cured and are sufficiently dry to support loading of carpet and installation operations, as determined by floor covering manufacturer's recommendations.

1.07 GUARANTEE

- A. Special Warranty for Carpet Tiles: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
- B. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
  - 1. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, dimensional stability, delamination.
  - 2. Warranty Period: 10 years from date of Substantial Completion.

1.08 EXTRA MATERIALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Carpet Tile: Full-size units equal to five percent (5%) of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

PART 2 PRODUCTS

2.01 MATERIALS

- A. Walk-Off Carpet Tile: As scheduled on drawings.
- B. Adhesives: Water-resistant, mildew-resistant, non-staining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
  - 1. VOC Limits: Provide adhesives with VOC content not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA method 24).

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye lot integrity. Do not mix dye lots in same area.
- C. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- D. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

- E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- F. Install pattern parallel to walls and borders.
- G. Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.

3.03 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
  - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
  - 2. Remove yarns that protrude from carpet tile surface.
  - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protection of Indoor Installations."
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION



PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.02 SECTION INCLUDES

- A. Sound absorptive wall panels as indicated on the drawings and specified herein.

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. Consult all other Sections to determine the extent of work specified elsewhere but related to this Section. This work shall be properly coordinated to produce an installation satisfactory to the Owner.

1.04 SUBMITTALS

- A. Submit samples, mock-up of all materials and fabrics specified, and acoustical test data to Architect for approval. No substitutions are to be made without approval. Any non-approved materials that have been installed shall be removed and replaced with approved materials at no expense to the Owner.
- B. Site Inspection: Manufacturer's representative or Authorized Vendor of Manufacturer's Products shall conduct an on site inspection of field conditions prior to determining final dimensions and bill of materials.
- C. Shop Drawings: Submit complete fabrication and installation Drawings for all assemblies. Provide full size details of all major components. Installation drawings shall include all required supplemental framing, attachment details, and end cap details where panels are to be installed at vertical angles as required by drawings. Submittals of panel layouts for final approval shall show field verified dimensions.
- D. Submit sound absorption test data measured in an independent accredited acoustical test laboratory demonstrating compliance with acoustical performance specification. Laboratory test samples shall be equal to the specified products with respect to core material, thickness, finish fabrics, and mounting. Products shall be tested in a Type A mounting unless otherwise specified.

1.05 PRODUCT HANDLING

- A. Shipping: Package, handle, transport and store all materials at the jobsite in a manner that will avoid damage. All materials shall be delivered in manufacturer's original labeled, unopened cartons.
- B. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.
- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

1.06 QUALITY ASSURANCE:

- A. Wall panel fabricator shall be qualified for the work of this Section and shall have minimum 5 years experience with installations of similar construction.
- B. No substitutions are to be made without approval. Any non-approved materials that have been installed shall be removed and replaced with approved materials at no expense to the Owner.

- C. Specified Products are specified to establish standards of quality, performance and design concept. The products of other manufacturers are acceptable by prior approval only.

#### 1.07 COORDINATION

- A. Coordinate acoustical wall panel work with all existing conditions.

### PART 2 PRODUCTS

#### 2.01 GENERAL

- A. Fabricate panels to details and configurations shown on the Drawings in accordance with approved Shop Drawings and Mock-ups.
- B. All components of wall sound absorptive systems shall be manufactured by a single established manufacturer.

#### 2.02 ACOUSTICAL WALL PANELS

- A. Basis of Design: Tectum Wall Panels by Armstrong, as noted on finish schedule:
  - 1. Material: Wood fibers bonded with inorganic hydraulic cement.
  - 2. Thickness: 1 inch (25.4 mm) baseboard + 1 inch (25.4 mm) Tectum furring with SoniCor fiber core between furring.
  - 3. Edge: Long edges beveled.
  - 4. Width: As noted on drawings.
  - 5. Length: As noted on drawings.
  - 6. Color: Field paint per finish schedule.
  - 7. Mounting Style: Provide all fasteners for a complete single source installation.
- B. Substitutions: Per Section 01 25 00 – Substitution Procedures.

### PART 3 EXECUTION

#### 3.01 PROTECTION

- A. Protect panels from damage and soiling during shipping and installation until Owner's acceptance.

#### 3.02 WALL PANEL INSTALLATION

- A. Manufacturer shall determine and provide suitable fastening systems to affix panels to substrate. All fastening systems shall be recommended by the manufacturer for the appropriate substrate encountered in the field.
  - 1. Panels shall be installed by an authorized installer according to all manufacturer's instructions.
- B. Install and adjust panels to lines and levels to provide accurate alignment and reveal widths as detailed.
- C. Clean, repair or replace any panels which become soiled or damaged.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation: Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other sections.
- B. Field application of paints.
- C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated. Painting is required on all new and existing surfaces.
  - 1. The term "paint" is all inclusive, meaning emulsions, enamels, oil products, sealers, stains, varnishes, polyvinyl emulsions, latex emulsions, and similar coatings.
- D. Do Not Paint or Finish the Following Items:
  - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
  - 2. Items indicated to receive other finishes.
  - 3. Items indicated to remain unfinished.
  - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
  - 5. Non-metallic roofing and flashing.
  - 6. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, zinc, and lead.
  - 7. Marble, granite, slate, and other natural stones.
  - 8. Floors, unless specifically indicated.
  - 9. Ceramic and other types of tiles.
  - 10. Brick, glass unit masonry, architectural concrete, cast stone, integrally colored plaster and stucco.
  - 11. Exterior insulation and finish system (EIFS).
  - 12. Glass.
  - 13. Concrete masonry units in utility, mechanical, and electrical spaces, unless specifically indicated.
  - 14. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 - Metal Fabrications: Shop-primed items.
- B. Section 09 91 23 - Interior Painting.

1.03 DEFINITIONS

- A. Conform to ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

- A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.
- B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2005 (Reapproved 2017).
- C. ASTM D4259 - Standard Practice for Abrading Concrete; 1988 (Reapproved 2012).
- D. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2016.
- E. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.
- F. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.
- G. SSPC V2 (PM2) - Systems and Specifications: Steel Structures Painting Manual, Volume 2; 2015.
- H. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
- I. SSPC-SP 2 - Hand Tool Cleaning; 1982, with Editorial Revision (2004).
- J. SSPC-SP 3 - Power Tool Cleaning; 1982, with Editorial Revision (2004).

- K. SSPC-SP 6 - Commercial Blast Cleaning; 2007.
- L. SSPC-SP 13 - Surface Preparation of Concrete; 1997 (Reaffirmed 2003).

1.05 SUBMITTALS

- A. See Section 01 30 00 – Administrative Requirements.
- B. Product Data: Prior to purchasing any paint material, provide complete list of products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
  - 2. MPI product number (e.g. MPI #47).
  - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
  - 1. Where sheen is specified, submit samples in only that sheen.
  - 2. Where sheen is not specified, discuss sheen options with MBI Companies before preparing samples, to eliminate sheens definitely not required.
  - 3. Allow 30 days for approval process, after receipt of complete samples by MBI Companies.
  - 4. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as masonry, siding, factory finished metals, and shingle roofing, have been approved.
- D. Manufacturer's Instructions: Indicate special surface preparation procedures.
- E. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Paint and Finish Materials: Additional 5 percent, but not less than 1 unopened gallon of each material and color; from the same product run, store where directed.
  - 3. Label each container with color in addition to the manufacturer's label.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Obtain primers, block fillers and undercoat paint for each system from same manufacturer as finish coats.
- C. Provide primers compatible with finish system in strict accordance with manufacturer's recommendations. Upon request, furnish data for characteristics of finish materials to ensure compatible prime coats are used.
- D. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years' experience, with a record of successful in-service performance, and approved by manufacturer. Provide references from past clients if required by Architect.
- E. Notify Architect of problems anticipated using materials specified prior to bid. No claim by the Contractor concerning the unsuitability of any material specified or his inability to produce satisfactory results therewith will be considered unless such claim is made in writing to the Architect before the Contract for Construction is signed by the General Contractor.
- F. Provide manufacturer's best quality paint material for each coating type specified. Proprietary names used to designate colors or materials are not intended to imply that products named are required, or to exclude equal products of other manufacturers. Paint material containers not displaying manufacturer's product identification is not acceptable.

1.07 MOCK-UP

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.

- B. Provide a panel, 10 feet long by 10 feet wide, illustrating each paint color, texture, and finish. Final acceptance of colors will be given based on job-applied mock-ups.
- C. Provide door and frame assembly illustrating paint color, texture, and finish.
- D. Locate where directed by the Architect.
- E. Mock-up accepted by MBI Companies may remain as part of the work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in manufacturer's original sealed and labeled containers; inspect to verify acceptability. Containers are to arrive unopened.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, application instructions, drying time, cleanup requirements, color designation name and number, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.09 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
  - 1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by MBI Companies is obtained using the specified procedures for substitutions prior to start of Work.
  - 2. Substitution of other products by the same manufacturer is preferred over substitution of products by a different manufacturer.
- B. Paints:
  - 1. Base Manufacturers:
    - a) PPG Paint, Inc. (PPG): [www.ppgpaints.com](http://www.ppgpaints.com).
    - b) Sherwin-Williams Company (SW); [www.sherwin-williams.com](http://www.sherwin-williams.com).
    - c) Benjamin Moore (BM): [www.benjaminmoore.com](http://www.benjaminmoore.com).
- C. Primer Sealers: Same manufacturer as top coats.
- D. Substitutions: 01 25 00 - Substitution Procedures.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
  - 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.

2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
  3. Supply each paint material in the quantity required to complete the entire project's work from a single production run.
  4. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by MBI Companies from the manufacturer's full line.
- C. Colors: As indicated on drawings, or as selected by Architect.
1. Extend colors to surface edges; colors may change at any edge as directed by MBI Companies.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Each subcontractor to carefully inspect and examine surfaces or areas prepared to receive his work. Should he consider such surfaces or areas not proper or unsatisfactory for the installation or application of his work, he shall notify the Contractor in writing and copy the Architect. Should he proceed before proper corrections have been made, it shall be at his own risk and any subsequent corrections that may be ordered or required shall be at his expense.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Test shop-applied primer for compatibility with subsequent cover materials.
- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
1. Fiber Cement Siding: 12 percent.
  2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
  3. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
  4. Concrete Floors and Traffic Surfaces: 8 percent.

#### 3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing. Upon completion of each space, replace above items. Use only skilled workers for removing and connecting above items.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Concrete:
1. Remove release agents, curing compounds, efflorescence, all loose materials, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
  2. Clean concrete according to ASTM D4258. Allow to dry.
  3. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
- G. Masonry:
1. Remove efflorescence, chalk, and all loose materials. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
  2. Prepare the surface as recommended by the top coat manufacturer.

- H. Fiber Cement Siding: Remove dirt, dust and other foreign matter with a stiff fiber brush. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
- I. Exterior Gypsum Board: Fill minor defects with exterior filler compound. Spot prime defects after repair.
- J. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry, and vacuum before painting.
- K. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
- L. Galvanized Surfaces:
  - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
  - 2. Prepare the surface according to SSPC-SP 2.
- M. Ferrous Metal:
  - 1. Solvent clean according to SSPC-SP 1.
  - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
  - 3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.
- N. Exterior Wood Surfaces to Receive Opaque Finish: Sand to a smooth and even surface. Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Back prime concealed surfaces before installation. Spot prime all ends of trim.
- O. Wood Surfaces to Receive Enamel, Varnish, or Oil Finish: Sand between coats with fine sandpaper to produce an even, smooth surface. Match filler color to natural wood. After paste filler is set, wipe across the grain, then with the grain, to ensure a clean surface.
- P. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease and dirt.
- Q. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with tinted primer. Remove doors, if necessary, to paint bottom edge. Finish side edges of wood doors to match faces.
- R. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

### 3.03 APPLICATION

- A. Paint all exterior wood.
- B. Paint all new metal structure exposed to exterior of building.
- C. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- D. Apply water-based paints only when temperature of surfaces to be painted and surrounding air temperatures are 50° F -90° F.
- E. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are 45° F -95° F.
- F. Do not apply paint in snow, rain, fog, or mist, or when relative humidity exceeds 85%, at temperatures less than 5° F (3° C) above the dewpoint, or to damp or wet surfaces.
- G. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.
- H. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- I. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- J. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

- K. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- L. Sand wood and metal surfaces lightly between coats to achieve required finish.
- M. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- N. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

#### 3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection.
- B. If any paint is applied to damp material or improperly prepared surfaces, use corrective measures as determined by Architect.

#### 3.05 CLEANING

- A. Store and mix paint materials only in spaces designated and assigned for the purpose.
- B. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site. Exercise strict precautions at all times against fire. Do not permit paint or oil-soaked rags or waste to accumulate.
- C. Upon completion, remove all paint spots from horizontal surfaces, glass, and other surfaces not intended to receive paint. Do not scratch or damage adjacent finished surfaces.

#### 3.06 PROTECTION

- A. Protect finishes until completion of project.
- B. Protect all adjacent work and materials by suitable covering, or other methods, during the progress of work.
- C. Protect work of other trades, whether or not scheduled to receive paint, against damage by painting.
- D. Provide "Wet Paint" signs to protect newly painted surfaces.
- E. Remove temporary protective wrappings, provided by others to protect their work, after completing painting operations.
- F. At completion of construction activities of other trades and at Substantial Completion, correct damage by cleaning, repairing or replacing, and repainting as approved by Architect.

#### 3.07 SCHEDULE OF PAINTING

- A. General:
  - 1. All items listed in the following paint schedule may not apply to this project.
  - 2. Numbers of coats listed in this schedule are minimum. If coverage is not complete and uniform, additional coats must be added until the finished surface is satisfactory and accepted by the Architect.
  - 3. Omit primer on metal surfaces that have been shop primed and touch up painted.
  - 4. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
  - 5. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.
  - 6. Wood Doors Not Factory Finished: Stain followed by one (1) coat sealer primed followed by two (2) coats satin clear varnish.
  - 7. Specific finishes listed in the finish schedule on the drawings take precedence over the finishes listed below. Luster levels indicated or scheduled on drawings shall take precedence over those specified below. If they differ, provide like product below in luster indicated on drawings.
- B. Metal: Provide the following finish system over miscellaneous ferrous metal, structural, hollow metal doors and frames, louvers:
  - 1. Semi gloss, Acrylic Enamel Finish: Two (2) finish coats over a rust inhibitive primer:

- a. Primer: Rust inhibitive metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils:
    - PPG: 6-208 Speedhide Interior/Exterior Rust Inhibitive Steel Primer.
    - PPG: Speedhide Interior/Exterior Rust Inhibitive Steel Primer, 6-212 Series. (MPI #79)
    - PPG: PPG Paints PMC Multi-Purpose Primer, 4160 Series. (MPI #79)
    - PPG: PPG Paints PMC Metalhide One Pac Inorganic Zinc Rich Primer 97-676 (MPI #19)
    - SW: Pro Industrial DTM Acrylic Primer/Finish, B66W1 (OR) Pro Industrial Pro-Cryl Primer, B66W01310.
    - SW: Kem Kromik Universal Metal Primer, B50Z (Alkyd).
  - b. First and Second Coats: Semi gloss, exterior, acrylic –latex enamel applied at spreading rate recommended by manuf. to achieve total dry film thickness of not less than 2.6 mils.
    - PPG: 78 Line Sun-Proof Semi-Gloss House and Trim Paint.
    - PPG: Speedhide Exterior Latex Semi-Gloss, 6-900XI Series. (MPI #11)
    - PPG: Sun Proof Exterior 100% Acrylic Semi-Gloss Paint 78 Series (MPI #11).
    - SW: A100 Exterior Acrylic Gloss A8 Series.
    - SW: Pro Industrial DTM Semi-Gloss Coating, B66W01151.
- C. Non Ferrous Metal: Galvanized. (Acid etch galvanized surfaces that have not weathered at least six months prior to beginning painting operations). Provide the following finish systems over exterior zinc coated (galvanized) metal surfaces:
- 1. Semi gloss, Acrylic Enamel Finish: Two (2) finish coats over a galvanized metal primer.
    - a. Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.
      - PPG: 90-709 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel.
      - PPG Paints PMC Pitt-Tech Plus DTM Industrial Primer, 4020PF Series. (MPI #134)
      - SW: Pro Industrial DTM Acrylic Primer/Finish, B66W1 (OR) Pro Industrial Pro-Cryl Primer, B66W01310.
    - b. First and Second Coats: Semi gloss, exterior, acrylic latex enamel applied at spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 2.6 mils.
      - PPG: 78 Line Sun-Proof Semi-Gloss Acrylic Latex House and Trim Paint.
      - PPG Paints Sun Proof Exterior 100% Acrylic Semi-Gloss Paint 78 Series.
      - SW: A100 Exterior Acrylic Gloss A8 Series.
      - SW: Pro Industrial DTM Semi-Gloss Coating, B66W01151.
- D. Aluminum surfaces in contact with masonry or steel to have a coat of zinc chromate.
- E. Smooth Wood and PVC pipe columns: Provide the following finish systems over smooth wood siding and other smooth, exterior wood surfaces:
- 1. Semi gloss, Acrylic Enamel Finish: Two (2) finish coats over a primer.
    - a. Primer: Exterior, alkyd or latex wood primer, as recommended by the manufacturer for this substrate, applied at a spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils.
      - PPG: 17-921XI Seal Grip Acrylic Primer (MPI #6).
      - SW: (Wood) A100 Exterior Latex Primer, B42W08141.
      - SW: (PVC) Extreme Bond Primer, B51W01150.
    - b. First and Second Coats: Semi gloss, waterborne, exterior, acrylic enamel applied at a spreading rate recommended by the manuf. to achieve a total dry film thickness of not less than 2.4 mils.
      - PPG: 78 Line Sun-Proof Semi-Gloss Acrylic Latex House and Trim Paint.
      - SW: A100 Exterior Acrylic Gloss A8 Series.
      - SW: Pro Industrial DTM Semi-Gloss Coating, B66W01151.
- F. GFRC fabrications, Fiber-cement Siding and Trim: Provide the following finish systems over fiber-cement siding and trim surfaces:
- 1. Semi-Gloss, Acrylic Enamel Finish: Two (2) finish coats over a primer.
    - a. Primer: Exterior, Alkali Resistant 100% Acrylic primer, as recommended by manufacturer for this substrate, applied at a spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2 mils.
      - PPG: Seal Grip Acrylic Primer, 17-921XI Series. (MPI #3)

- PPG: 4-603XI Perma-Crete Interior/Exterior Alkali Resistant Primer (MPI #3).  
SW: Loxon Concrete & Masonry Primer, Flat, LX02W0050.
- b. First and Second Coats: Semi gloss, waterborne, exterior, acrylic enamel applied at a spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 2.4 mils.  
PPG: 78 Line Sun-Proof Semi-Gloss Acrylic Latex House and Trim Paint.  
SW: A100 Exterior Acrylic Gloss A8 Series.  
SW: Pro Industrial DTM Semi-Gloss Coating, B66W01151.
- G. Concrete Block: Provide the following finish over exterior concrete masonry units:
1. Flat Smooth Elastomeric Coating: Two (2) finish coats over block filler.
- a. Block Filler: High performance, latex block filler applied a spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 9.0 mils.  
PPG: 4-100XI Perma-Crete LTC Acrylic Block Filler (MPI #4).  
SW: Pro Industrial Heavy Duty Block Filler, B42W150 (OR) Loxon Block Surfacer, LX01W0200.
- b. First and Second Coats: Flat, exterior, Smooth Elastomeric Coating applied at spreading rate recommended by manufacturer to achieve total dry film thickness of less than 12 mils.  
PPG: Perma-Crete Pitt-Flex 4-110XI Acrylic Elastomeric Paint.  
SW: Loxon XP Waterproofing Coating, LX11W0051 (OR) Conflex XL HB Smooth Coating, CF11 Series.
2. Exterior Coating: Finish coat should be applied with an airless sprayer and backrolled with a medium napp roller to eliminate pin holes.
- H. Concrete, Stucco, and Masonry (Other than Concrete Masonry Units):
1. Flat Acrylic Finish: Two (2) finish coats over a primer.
- a. Primer: Alkali resistant, exterior, acrylic latex primer applied at spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 1.5 mils.  
PPG: Seal Grip Acrylic Primer, 17-921XI Series (MPI #3).  
PPG: 4-603XI Speedhide Interior/Exterior Acrylic Latex Alkali Resistant Primer (MPI #3).  
SW: Loxon Concrete & Masonry Primer, Flat, LX02W0050.
- b. First and Second Coats: Flat, exterior, acrylic emulsion paint applied at a spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 2.4 mils.  
PPG: 56-110XI Speed Cryl Exterior Water Base Paint.  
SW: A100 Exterior Latex Flat House Paint, A6 Series (OR) Loxon Self-Cleaning, Flat, LX13W0051.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation: Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other sections.
- B. Field application of paints.
- C. Materials for backpriming woodwork.
- D. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated. Painting is required on all new and existing surfaces.
  - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
  - 2. Prime surfaces to receive wall coverings.
  - 3. Mechanical and Electrical:
    - a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
    - b. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
    - c. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
  - 4. The term "paint" is all inclusive, meaning emulsions, enamels, oil products, sealers, stains, varnishes, polyvinyl emulsions, latex emulsions, and similar coatings.
- E. Do Not Paint or Finish the Following Items:
  - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
  - 2. Items indicated to receive other finishes.
  - 3. Items indicated to remain unfinished.
  - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
  - 5. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, and lead items.
  - 6. Marble, granite, slate, and other natural stones.
  - 7. Floors, unless specifically indicated.
  - 8. Ceramic and other tiles.
  - 9. Brick, architectural concrete, cast stone, integrally colored plaster and stucco.
  - 10. Glass.
  - 11. Concrete masonry units in utility, mechanical, and electrical spaces, unless specifically indicated
  - 12. Acoustical materials, unless specifically indicated.
  - 13. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 05 12 13 – Architecturally-Exposed Structural Steel Framing: Substrate for coating.
- B. Section 05 50 00 - Metal Fabrications: Shop-primed items.
- B. Section 09 21 16 – Gypsum Board Assemblies: Substrate for coating.
- C. Section 09 91 13 - Exterior Painting.

1.03 DEFINITIONS

- A. Comply with ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.
- C. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2005 (Reapproved 2017).
- D. ASTM D4259 - Standard Practice for Abrading Concrete; 1988 (Reapproved 2012).
- E. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2016.
- F. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.
- G. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.
- H. SSPC V1 (PM1) - Good Painting Practice: Painting Manual, Volume 1; 2016.
- I. SSPC V2 (PM2) - Systems and Specifications: Steel Structures Painting Manual, Volume 2; 2015.
- J. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
- K. SSPC-SP 2 - Hand Tool Cleaning; 1982, with Editorial Revision (2004).
- L. SSPC-SP 3 - Power Tool Cleaning; 1982, with Editorial Revision (2004).
- M. SSPC-SP 6 - Commercial Blast Cleaning; 2007.
- N. SSPC-SP 13 - Surface Preparation of Concrete; 1997 (Reaffirmed 2003).

1.05 SUBMITTALS

- A. See Section 01 30 00 – Administrative Requirements.
- B. Product Data: Prior to purchasing any paint material, provide complete list of products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
  - 2. MPI product number (e.g. MPI #47).
  - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
  - 1. Where sheen is specified, submit samples in only that sheen.
  - 2. Where sheen is not specified, discuss sheen options with MBI Companies before preparing samples, to eliminate sheens definitely not required.
  - 3. Allow 30 days for approval process, after receipt of complete samples by MBI Companies.
  - 4. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as masonry, factory finished metals, wood cabinets, and wood doors, have been approved.
  - 5. Wood used to display stains shall be the same species on which the stain is to be used.
- D. Manufacturer's Instructions: Indicate special surface preparation procedures.
- E. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Paint and Finish Materials: Additional 5 percent, but not less than 1 unopened gallon of each material and color; from the same product run, store where directed.
  - 3. Label each container with color and room locations in addition to the manufacturer's label.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Obtain primers, block fillers and undercoat paint for each system from same manufacturer as finish coats.
- C. Provide primers compatible with finish system in strict accordance with manufacturer's recommendations. Upon request, furnish data for characteristics of finish materials to ensure compatible prime coats are used.
- D. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 5 years' experience, with a record of successful in-service performance, and approved by manufacturer. Provide references from past clients if required by Architect.
- E. Notify Architect of problems anticipated using materials specified prior to bid. No claim by the Contractor concerning the unsuitability of any material specified or his inability to produce satisfactory results therewith will be considered unless such claim is made in writing to the Architect before the Contract for Construction is signed by the General Contractor.
- F. Provide manufacturer's best quality paint material for each coating type specified. Proprietary names used to designate colors or materials are not intended to imply that products named are required, or to exclude equal products of other manufacturers. Paint material containers not displaying manufacturer's product identification is not acceptable.

1.07 MOCK-UP

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.
- B. Provide panel, 10 feet long by 10 feet wide, illustrating each paint color, texture, and finish. Final acceptance of colors will be given based on job-applied mock-ups.
- C. Provide door and frame assembly illustrating paint color, texture, and finish.
- D. Locate where directed by Architect.
- E. Architect-approved mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in manufacturer's original sealed and labeled containers; inspect to verify acceptability. Containers are to arrive unopened.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, application instructions, drying time, cleanup requirements, color designation name and number, VOC content, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.09 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply materials when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.
- D. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
  - 1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by MBI Companies is obtained using the specified procedures for substitutions prior to start of Work.
  - 2. Substitution of other products by the same manufacturer is preferred over substitution of products by a different manufacturer.
- B. Paints:
  - 1. Base Manufacturers:
    - a) PPG Paints: [www.ppgpaints.com](http://www.ppgpaints.com).
    - b) Sherwin-Williams Paint Company: [www.sherwin-williams.com](http://www.sherwin-williams.com).
    - c) Benjamin Moore: [www.benjaminmoore.com](http://www.benjaminmoore.com).
- C. Primer Sealers: Same manufacturer as top coats.
- D. Substitutions: 01 25 00 - Substitution Procedures.

### 2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
  - 1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at [www.paintinfo.com](http://www.paintinfo.com), for specified MPI categories, except as otherwise indicated.
  - 2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
  - 3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
  - 4. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
  - 5. Supply each paint material in quantity required to complete entire project's work from a single production run.
  - 6. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content:
  - 1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
    - a. Architectural coatings VOC limits of the State in which the Project is located.
  - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by MBI Companies from the manufacturer's full line.
- D. Colors: As indicated on drawings, or as selected by Architect.
  - 1. Extend colors to surface edges; colors may change at any edge as directed by MBI Companies.
  - 2. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

2.03 GERMICIDAL DETERGENT: (Use if mold and mildew has been found.)

A. Approved Manufacturers:

1. X-14 Professional Instant Mildew Stain Remover - WD-40 Company (888-324-7596)
2. Tilex Mold & Mildew Remover - Clorox Co. (800-227-1860)
3. Tilex Mildew Root Penetrator and Remover - Clorox Co. (800-227-1860)

PART 3 EXECUTION

3.01 EXAMINATION

- A. Each subcontractor to carefully inspect and examine surfaces or areas prepared to receive his work. Should he consider such surfaces or areas not proper or unsatisfactory for the installation or application of his work, he shall notify the Contractor in writing and copy the Architect. Should he proceed before proper corrections have been made, it shall be at his own risk and any subsequent corrections that may be ordered or required shall be at his expense.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Test shop-applied primer for compatibility with subsequent cover materials.
- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
  1. Gypsum Wallboard: 12 percent.
  2. Plaster and Stucco: 12 percent.
  3. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
  4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
  5. Concrete Floors and Traffic Surfaces: 8 percent.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing. Upon completion of each space, replace above items. Use only skilled workers for removing and connecting above items.
- D. Mold and Mildew Removal: If mold or mildew is observed on surfaces to be painted, notify Architect for direction. If, in the Architect's opinion, the mold is remediable; remove contamination and neutralize surfaces as recommended in writing by manufacturer of selected product. If, in the Architect's opinion, the mold is not remediable, request direction before proceeding.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Concrete:
  1. Remove release agents, curing compounds, efflorescence, all loose materials, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
  2. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
- F. Masonry:
  1. Remove efflorescence, chalk, and all loose materials. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
  2. Prepare surface as recommended by top coat manufacturer.
- G. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry, and vacuum before painting.

- H. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair. Wall finish to meet specified level.
- I. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- J. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.
- K. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
- L. Galvanized Surfaces:
  - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
  - 2. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
  - 3. Prepare surface according to SSPC-SP 2.
- M. Ferrous Metal:
  - 1. Solvent clean according to SSPC-SP 1.
  - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
  - 3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.
- N. Wood Surfaces to Receive Opaque Finish: Sand to a smooth and even surface. Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation. Spot prime all ends of trim.
- O. Wood Surfaces to Receive Enamel, Varnish, or Oil Finish: Sand between coats with fine sandpaper to produce an even, smooth surface. Match filler color to natural wood. After paste filler is set, wipe across the grain, then with the grain, to ensure a clean surface.
- P. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease and dirt.
- Q. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with tinted primer. Remove doors, if necessary, to paint bottom edge. Finish side edges of wood doors to match faces.
- R. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

### 3.03 APPLICATION

- A. Paint all interior wood.
- B. Paint all new metal structure exposed to interior of building.
- C. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- D. Maintain temperature of rooms where varnish or enamel is being applied at 70 degrees F or more, and at 50 degrees F or more during other interior painting.
- E. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- F. Apply all materials under adequate illumination, evenly spread and smoothly flowed on without runs or sags. Only skilled workmen shall be employed.
- G. When painting existing surfaces or new work, cut into existing surfaces. Extend new paint coverage corner to corner and floor to ceiling; covering entire plane of surface to be painted.
- H. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- I. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- J. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

- K. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide. Vary tints of succeeding coats slightly to permit identification of coats. When color, stain, dirt, or undercoats show through the final coat of paint, apply additional coats until the finish is of uniform color and appearance and coverage is complete.
- L. Sand wood and metal surfaces lightly between coats to achieve required finish.
- M. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- N. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- O. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

#### 3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection.
- B. If any paint is applied to damp material or improperly prepared surfaces, use corrective measures as determined by Architect.

#### 3.05 CLEANING

- A. Store and mix paint materials only in spaces designated and assigned for the purpose.
- B. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site. Exercise strict precautions at all times against fire. Do not permit paint or oil soaked rags or waste to accumulate.
- C. Upon completion, remove all paint spots from floors, glass, and other surfaces not intended to receive paint. Do not scratch or damage adjacent finished surfaces.

#### 3.06 PROTECTION

- A. Protect finishes until completion of project. B. Protect all adjacent work and materials by suitable covering, or other methods, during the progress of work.
- C. Protect work of other trades, whether or not scheduled to receive paint, against damage by painting.
- D. Provide "Wet Paint" signs to protect newly painted surfaces.
- E. Remove temporary protective wrappings, provided by others to protect their work, after completing painting operations.
- F. At completion of construction activities of other trades and at Substantial Completion, correct damage by cleaning, repairing or replacing, and repainting as approved by Architect.

#### 3.07 SCHEDULE OF PAINTING

- A. General:
  - 1. All items listed in the following paint schedule may not apply to this project.
  - 2. Numbers of coats listed in this schedule are minimum. If coverage is not complete and uniform, additional coats must be added until the finished surface is satisfactory and accepted by the Architect.
  - 3. Omit primer on metal surfaces that have been shop primed and touch up painted.
  - 4. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
  - 5. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.
  - 6. Where graphics are shown on the drawings they shall be applied in two (2) coats of Latex Enamel with two (2) coats of clear acrylic applied over finished graphics. Graphics shall be applied by an Architect and Owner approved professional sign painter.

7. Electric Panel Boxes: Unless factory primed or prefinished, two (2) coats Rustoleum over prime coat.
  8. Exposed Pipe, Pipe Hangers, Sprinkler Pipe, Sprinkler Pipe Hangers, Supports etc.: Two (2) coats satin enamel over metal primer.
  9. Exposed Ductwork: Two (2) coats satin enamel over one (1) coat metal primer for galvanized.
  10. Wood Doors Not Factory Finished: Stain followed by one (1) coat sealer primed followed by two (2) coats satin clear varnish.
  11. Specific finishes listed in the finish schedule on the drawings take precedence over the finishes listed below. Luster levels indicated or scheduled on drawings shall take precedence over those specified below. If they differ, provide like product below in luster indicated on drawings.
- B. Concrete and Masonry Walls (Other than Concrete Masonry Units): Provide the following paint systems over interior concrete and brick masonry surfaces.
1. Flat Acrylic Finish: Two (2) finish coats over a primer. (Omit primer on previously painted surfaces.)
    - a. Primer: Alkali resistant, acrylic latex, interior primer applied at spreading rate recommended by manufacturer to achieve a total dry film thickness of not less than 1.0 mil.  
PPG: Speedhide Interior Latex Sealer, 6-2. (MPI #50)  
PPG: Speedhide zero Interior Latex Sealer, 6-4900XI. (MPI #50)  
SW: Harmony Interior Latex Primer, B11W01500. (MPI #50)  
SW: ProMar 200 Zero VOC Interior Latex Primer, B28W02600. (MPI #50)  
BM: Regal, N216. (MPI #50)  
BM: Super Spec, 253/K253 (MPI #50)
    - b. First and Second Coats: Flat, latex based, interior paint applied at spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 2.5 mils.  
PPG: Speedhide zero Latex, 6-4110XI Series, Flat. (MPI #53)  
PPG: Speedhide Pro-EV zero Interior Wall and Ceiling Latex Flat, 12-110XI Series. (MPI #53)  
SW: ProMar 200 Zero VOC Interior Latex, Flat, B30W12651. (MPI #53)  
SW: SuperPaint Air Purifying Flat, A86W00061. (MPI #53)  
BM: Regal Classic, Flat. (MPI #53)  
BM: Regal Select, Flat, 547/K547. (MPI #53)
- C. Concrete floors: Provide the following finish systems over interior concrete floors. Verify compatibility with curing and sealing agents prior to applying.
1. Satin, Acrylic Enamel Finish: Two (2) finish coats over primer.
    - a. Primer: Alkali resistant, waterborne acrylic latex alkali resistant primer applied at spreading rate recommended by manuf. to achieve total dry film thickness of not less than 1.0 mil.  
PPG: 6603 Acrylic latex alkali resistant primer.  
SW: ArmorSeal Tread-Plex Primer, B90 Series.
    - b. First and Second Coats: Satin waterborne DTM acrylic enamel paint applied at spreading rate recommended by manuf. to achieve total dry film thickness of not less than 2.5 mils.  
PPG: Floor and Porch Enamel 100% Acrylic Latex, 3-510 Series, Satin.  
PPG: Break-Through Interior/Exterior Satin Water-Borne Acrylic, V51-410 Series.  
SW: Protective & Marine ArmorSeal Tread-Plex, B90W111. (MPI #60)  
SW: Porch & Floor Enamel, A32W00251.
- D. Concrete Masonry Units: provide the following finish systems over interior concrete masonry block units:
1. Low Luster, Acrylic Enamel Finish: Two (2) finish coats over a block filler.
    - a. Block Filler: High performance, latex based, block filler applied at spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 5.0 mils.  
PPG: 6-15XI Speedhide Masonry Hi Fill Latex Block Filler. (MPI #4)  
SW: PrepRite Interior/Exterior Block Filler, B25W25 (dry area, acrylic topcoats). (MPI #4)  
BM: Coronado Super Kote 5000 Latex Production Block Filler, 958. (MPI #4)
    - b. First and Second Coats: Low Luster (eggshell or satin), acrylic latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.8 mils.  
PPG: Break-Through Interior/Exterior Satin Water-Borne Acrylic, V51-410 Series.  
SW: ProMar 200 HP Zero VOC, Low Gloss Eg-Shel, B41W01951. (MPI #138)  
SW: ProMar 200 HP Zero VOC Interior Acrylic, Eg-Shel, B20W01951. (MPI #139)

BM: Regal Select Waterborne Premium Interior Paint & Primer, Eggshell, 549/K549. (MPI #138)

- E. Epoxy Painted Concrete Masonry Units: provide the following finish systems over interior concrete masonry block units:
1. Semi-gloss Polyamid Epoxy Finish: Two (2) finish coats over a block filler.
    - a. Block Filler: Heavy Duty Acrylic block filler applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 12mils.
      - PPG: 4-100XI PermaCrete Acrylic Masonry Surfer Filler ( pH up to 13, low solvent, high performance coatings tolerant) (MPI #4)
      - SW: Pro Industrial Heavy-Duty Block Filler, B42W150. (MPI #4)
      - SW: Loxon Block Surfer, LX01W0200.
      - BM: Ultra Spec Hi-Build Masonry Block Filler, 958. (MPI #4)
    - b. First and Second Coats: Semi Gloss Polyamide Epoxy applied at spreading rate recommended by manufacturer to achieve a total dry film thickness of not less than 5 mils.
      - PPG: Pitt-Glaze WB1 Pre-Catalyzed Water-Borne Acrylic Epoxy, 16-510 Series, Semi-Gloss.
      - PPG: Pitt-Tech Plus Interior/Exterior WB DTM Enamel 4216 HP Series, Semi-Gloss.
      - SW: Pro Industrial Pre-Catalyzed Waterbased Epoxy, Semi-Gloss, K46W1151. (MPI #141)
      - BM: Regal Select Premium Interior Semi-Gloss Finish, 551/K551. (MPI #141)
- F. Gypsum Board: provide the following finish systems over interior gypsum board surfaces:
1. Flat Acrylic Finish: Two (2) finish coats over a primer. (Walls scheduled to receive wall fabric shall receive one coat of Latex Primer – Tint Primer to match wall fabric).
    - a. Primer: Latex – based, interior primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.
      - PPG: Speedhide Pro-EV Latex Sealer, 12-900.
      - PPG: Speedhide Interior Latex Sealer, 6-2.
      - PPG: Speedhide zero Interior Latex Sealer, 6-4900XI.
      - SW: Harmony Interior Latex Primer, B11W01500. (MPI #50)
      - SW: ProMar 200 Zero VOC Interior Latex Primer, B28W02600. (MPI #50)
      - BM: Regal, N216. (MPI #50)
      - BM: Super Spec, 253/K253 (MPI #50)
    - b. First and Second Coats: Flat, acrylic latex based, interior paint applied at spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 2.5 mils.
      - PPG: Speedhide zero Latex, 6-4110XI Series, Flat. (MPI #53)
      - PPG: Speedhide Pro-EV zero Interior Wall and Ceiling Latex Flat, 12-110XI Series. (MPI #53)
      - SW: ProMar 200 Zero VOC Interior Latex, Flat, B30W12651. (MPI #53)
      - SW: SuperPaint Air Purifying, Flat, A86W00061. (MPI #53)
      - BM: Regal Classic, Flat. (MPI #53)
      - BM: Regal Select, Flat, 547/K547. (MPI #53)
- G. Painted Interior Wood Surfaces: Provide the following paint finish systems over new, interior wood surfaces.
1. Semi gloss, Acrylic Enamel Finish: Two (2) finish coats over a wood undercoat. (Omit undercoat on previously painted surfaces).
    - a. Undercoat: Alkyd – or acrylic latex based, interior wood undercoat, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.
      - PPG: PPG Paints Seal Grip Acrylic Primer, 17-921XI Series. (MPI #39)
      - SW: Multi-Purpose Latex Primer / Sealer, B51W00450. (MPI #39)
      - SW: PrepRite ProBlock Latex Primer / Sealer, B51W00620 (MPI #39)
      - BM: Insl-X Prime All Multi-Surface Latex Primer Sealer, AP-1000. (MPI #39)
    - b. First and Second Coats: Semi gloss, acrylic latex, interior enamel applied at spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 2.6 mils.
      - PPG: Pitt-Glaze WB1 Pre-Catalyzed Water-Borne Acrylic Epoxy, 16-510 Series, Semi-Gloss.
      - PPG: Pitt-Tech Plus Interior/Exterior WB DTM Enamel 4216 HP Series, Semi-Gloss.
      - SW: Pro Industrial Pre-Catalyzed Waterbased Epoxy, Semi-Gloss, K46W1151. (MPI #141)
      - BM: Regal Select Premium Interior Semi-Gloss Finish, 551/K551. (MPI #141)

- H. Stained Woodwork: Provide the following stained finish over new, interior woodwork :
1. Waterborne, Satin Varnish Finish: Two (2) finish coats of a waterborne, clear satin varnish over a sealer coat and a waterborne, interior wood stain.
    - a. Stain Coat: Waterborne, interior wood stain applied at spreading rate recommended by manuf.  
PPG: 77 302 Rez Interior Semi Transparent Stain.  
SW: MinWax Performance Series Tintable Stain, 7150/7151 Series.  
SW: MinWax Performance Series Tintable Stain, 7250/7251, 250 VOC.  
BM: Lenmar QuickStain Waterborne Wiping Stain.
    - b. Sealer Coat: Clear sanding sealer applied at spreading rate recommended by manuf.  
PPG: 77 30 Rez Interior Quick Drying Sealer and Finish.  
SW: MinWax Series Fast Dry Sanding Sealer, 8158/8458.  
BM: Lenmar UltraMax Plus Water White Precatalyzed Lacquer, Satin.
    - c. First and Second Finish Coats: Waterborne varnish finish applied at spreading rate recommended by manufacturer.  
PPG: 77 49 Rez Satin Acrylic Clear Polyurethane.  
SW: MinWax Water Based Polyurethane, Semi-Gloss, 63020/71032.  
BM: Lenmar MegaVar Waterborne Polyurethane Clear Finish, Satin.
- I. Painted Ferrous Metal (Hollow Metal doors and frames, electrical panel boxes etc.): Provide the following finish over interior metal work.
1. Semi gloss Acrylic Enamel Finish: One finish coat over an enamel undercoat and a primer. (Omit primer on shop primed items)
    - a. Primer: Quick drying rust inhibitive, alkyd based or epoxy metal primer, as recommended by manufacturer for this substrate, applied at spreading rate recommended by manufacturer to achieve a total dry film thickness of not less than 1.5 mils.  
PPG: Multiprime Multi-Purpose Primer, 4160 Series. (MPI #76)  
SW: Protective & Marine Kem Bond HS Universal Alkyd Primer, B50WZ0004. (MPI #76)  
BM: Corotech Prep All Universal Metal Primer, V132/CV132. (MPI #76)
    - b. Undercoat: Alkyd, interior enamel undercoat or semi gloss, acrylic latex, interior enamel as recommended by the manufacturer for this substrate, applied at spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 1.3 mils.  
PPG: PPG Paints Seal Grip Interior/Exterior Alkyd Universal Primer Sealer, 17-941NF Series. (MPI #46)  
SW: Extreme Block Stain Blocking Primer / Sealer, B49W00600. (MPI #46)  
SW: ProBlock Interior Oil-based Primer, B79W08810 (MPI #46)  
BM: Super Spec Alkyd Enamel Undercoat & Primer Sealer, C245. (MPI #46)
    - c. Finish Coat: Semi gloss, acrylic latex, interior enamel applied at spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 1.3 mils.  
PPG: PPG Paints Speedhide zero Latex, 6-4510XI Series, Semi-Gloss. (MPI #54)  
SW: ProMar 200 Zero VOC Interior Latex Gloss, B21W04651. (MPI #54)  
BM: Regal Select Premium Interior Semi-Gloss Finish, 551/K551. (MPI #54)
- J. Non Ferrous Metal: Galvanized. Provide the following finish systems over exterior zinc coated (galvanized) metal surfaces:
1. Semi gloss, Acrylic Enamel Finish: Two (2) finish coats over a galvanized metal primer.
    - a. Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.  
PPG: 4020 PF Pitt-Tech Plus Interior/Exterior Waterborne Acrylic Primer Finish DTM Industrial Enamel. (MPI #134).  
SW: Sherwin-Williams Pro Industrial DTM Primer / Finish, B66W00011. (MPI #134)  
SW: Pro Industrial Pro-Cryl Universal Primer, B66W1310. (MPI #134)  
BM: Ultra Spec HP Acrylic Metal Primer, HP04/FP04. (MPI #134)
    - b. First and Second Coats: Semi gloss, acrylic latex enamel applied at spreading rate recommended by manufacturer to achieve total dry film thickness of not less than 2.6 mils.  
PPG: PPG Paints Speedhide zero Latex, 6-4510XI Series, Semi-Gloss. (MPI #54)  
SW: ProMar 200 Zero VOC Interior Latex Gloss, B21W04651. (MPI #54)  
BM: Regal Select Premium Interior Semi-Gloss Finish, 551/K551. (MPI #54)

- K. Metal Decking, Bar Joists, exposed metal structure (non galvanized): Provide the following finish systems over shop primed metal surfaces:
1. Flat Waterborne Acrylic Dry Fall Finish: Two (2) coats applied at spreading rate recommended by manufacturer to achieve a total dry film thickness of 4 mils.  
PPG: PPG Paints Speedhide Super Tech Water Based Interior Dry-Fog, 6-725XI, Flat. (MPI #118)  
SW: Pro Industrial Waterborne Acrylic Dryfall, Flat, B42W00181. (MPI #118)  
BM: Coronado Super Kote 5000 Dry Fall Acrylic Latex, Flat, N110. (MPI #118)
- L. Aluminum surfaces in contact with masonry or steel to have a coat of zinc chromate.
- M. Mechanical and Electrical Items:
1. All equipment such as pumps, tanks, air units, compressors, cabinets, etc., that have had their paint defaced, scarred or skinned shall be touched up with machinery enamel.  
PPG: Lavax Machinery Enamel, 23 Line.  
SW: Steel Spec Fast Dry Alkyd Enamel, B55W811.  
BM: Corotech High Performance Quick Dry Enamel, V230.
  2. All uncovered pipe hangers, tank stands, equipment support stands and brackets, uncovered portions of tank, and other mechanical apparatus, including factory finished items, shall be painted as scheduled above for painted ferrous metal.
  3. All hot water, cold water, steam, condensation, circulating water lines for heating and cooling, drains gas piping, electrical conduit, junction boxes and similar items exposed shall be painted as scheduled above for painted ferrous metal, galvanized metal or Aluminum Metal lite, as appropriate for the substitute.
  4. All electrical panel boxes, box covers, conduit junction boxes, brackets and accessories except those in electrical rooms shall have field finish paint, as scheduled above for ferrous metal over prime finish, or factory finish.
  5. Exposed Ductwork: As scheduled above for galvanized metal. Interior of ducts exposed to view shall be painted flat black for the first two (2) feet beyond grill or diffuser.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Markerboards
- B. Tackboard material

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Blocking and supports.
- B. Section 09 21 16 - Gypsum Board Assemblies: Concealed supports in metal stud walls.
- C. Section 10 22 39 - Folding Panel Partitions: Installation of visual display boards on operable partitions.

1.03 REFERENCE STANDARDS

- A. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.
- B. ANSI A208.1 - American National Standard for Particleboard; 2009.
- C. ASTM A424/A424M - Standard Specification for Steel, Sheet, for Porcelain Enameling; 2009a (Reapproved 2016).
- D. ASTM C208 - Standard Specification for Cellulosic Fiber Insulating Board; 2012.
- E. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
- G. PS 1 - Structural Plywood; 2009.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data on chalkboard, markerboard, tackboard, tackboard surface covering, trim, and accessories.
- C. Shop Drawings: Indicate wall elevations, dimensions, joint locations, special anchor details.
- D. Test Reports: Show compliance to specified surface burning characteristics requirements.
- E. Manufacturer's printed installation instructions.
- F. Manufacturer's Qualification Statement.
- G. Maintenance Data: Include data on regular cleaning, stain removal.

1.05 QUALITY ASSURANCE

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

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year warranty for chalkboard and markerboard to include warranty against discoloration due to cleaning, crazing or cracking, and staining.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Claridge Products and Equipment, Inc: [www.claridgeproducts.com](http://www.claridgeproducts.com).
- B. Substitutions: 01 25 00 - Substitution Procedures.

## 2.02 VISUAL DISPLAY UNITS

- A. Markerboards: Porcelain enamel on steel, laminated to core.
  - 1. Color: White.
  - 2. Steel Face Sheet Thickness: 24 gauge, 0.0239 inch .
  - 3. Core: Particleboard, manufacturer's standard thickness, laminated to face sheet.
  - 4. Backing: Aluminum foil, laminated to core.
  - 5. Size: As indicated on drawings.
  - 6. Frame: Extruded aluminum, with concealed fasteners.
  - 7. Frame Finish: Anodized, natural.
  - 8. Accessories: Provide marker tray and map rail.
- B. Tackboard material: Fine-grained, homogeneous natural cork.
  - 1. Cork Thickness: 1/8 inch.
  - 2. Backing: Hardboard, 1/4 inch thick, laminated to tack surface.
  - 3. Surface Burning Characteristics: Flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
  - 4. Size: As indicated on drawings.
- C. Combination Units and Units Made of More Than One Panel: Factory-assembled markerboards in a single frame of materials specified above.
  - 1. Join panels of different construction with H-shaped extruded aluminum molding finished to match frame.
  - 2. Join panels of similar construction with butt joints, aligned and secured with steel spline concealed in edge of core.
  - 3. Configuration: As indicated on drawings.
  - 4. Units Too Large to Ship Assembled: Fully assembled in factory, then disassembled for shipping.

## 2.03 MATERIALS

- A. Porcelain Enameled Steel Sheet: ASTM A424/A424M, Type I, Commercial Steel, with fired-on vitreous finish.
- B. Plywood: PS 1, Grade C-D, softwood.
- C. Hardboard for Cores: ANSI A135.4, Class 1 - Tempered, S2S (smooth two sides).
- D. Particleboard: ANSI A208.1; wood chips, set with waterproof resin binder, sanded faces.
- E. Gypsum Board: ASTM C1396/C1396M, paper/foil faced, plain type.
- F. Fiber Board: ASTM C208, cellulosic fiber board.
- G. Aluminum Sheet Backing: 27 gauge, 0.014 inch thick.
- H. Steel Sheet Backing: 28 gauge, 0.0149 inch, galvanized.
- I. Adhesives: Type used by manufacturer.

## 2.04 ACCESSORIES

- A. Map Rail: Extruded aluminum, manufacturer's standard profile, with cork insert and runners for accessories; 1 inch wide overall, full width of frame.
- B. Temporary Protective Cover: Sheet polyethylene, 8 mil thick.
- C. Marker Tray: Aluminum, manufacturer's standard profile, one piece full length of markerboard, molded ends, concealed fasteners, same finish as frame.
- D. Mounting Brackets: Concealed.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that field measurements are as indicated.

- B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.
- C. Verify flat wall surface for frameless adhesive-applied boards.

3.02 PREPARATION

- A. Remove switchplates, wall plates, and surface-mounted fixtures where tackable wall paneling is applied. Reinstall items on completion of installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install boards in accordance with manufacturer's instructions.
- B. Secure units level and plumb.
- C. Butt Joints: Install with tight hairline joints.
- D. Carefully cut holes in boards for thermostats.

3.04 CLEANING

- A. Clean board surfaces in accordance with manufacturer's instructions.
- B. Cover with protective cover, taped to frame.
- C. Remove temporary protective cover at Date of Substantial Completion.

END OF SECTION



PART 1 GENERAL

1.01 SCOPE

- A. Furnish all materials, labor, equipment, and supervision necessary to provide and install signage as shown on the drawings and specified herein.

1.02 RELATED DOCUMENTS

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 WARRANTY

- A. Provide manufacturers standard warranty.

PART 2 PRODUCTS

2.01 INTERIOR SIGNAGE MANUFACTURERS

- A. Manufacturers:
1. APCO Signs
  2. ASI Sign System
  3. InPro Corporation
  4. Scott Sign Systems (by Identity Group).
  5. Substitutions: See Section 01 25 00 – Substitution Procedures.

2.02 INTERIOR SIGNAGE

- A. Provide and install signage of type, color, thickness and mounting style as indicated on the drawings.
1. Size: 6" x 9" with square corners.
  2. Color: As selected by Architect from manufacturer's full range of color selections.
  3. Thickness: 1/8"
  4. Mounting: Factory-applied Very High Bond (VHB) Tape.
- B. Signs shall read as indicated below: Each shall have a graphic symbol, the applicable international symbol of accessibility and Grade 2 Braille as required by the Americans with Disabilities Act.
1. Doors into accessible restrooms indicated for male use shall have a sign which reads "MEN" and shall have man and ADA graphic.
  2. Doors into restrooms indicated for male use shall have a sign which reads "MEN" and shall have man graphic.
  3. Doors into accessible restrooms indicated for female use shall have signs which reads "WOMEN" and have the woman and ADA graphic.
  4. Doors into restrooms indicated for female use shall have signs which reads "WOMEN" and have woman graphic.
  5. Doors into accessible restrooms indicated for use by both sexes shall have a sign which reads "RESTROOM" and have the unisex graphic showing both a male and female character and ADA graphic.
  6. Doors into restrooms indicated for use by both sexes shall have a sign which reads "RESTROOM" and have the unisex graphic showing both a male and female character.
  7. Doors into Stairways shall have a sign which reads "STAIRS" and shall have an ADA-compliant graphic.
  8. Elevator doors not on the level of egress shall have a sign which reads "IN CASE OF FIRE USE STAIRS" and ADA-compliant graphic.
  9. Doors indicated on the drawings as an egress door shall have a sign which reads "EXIT" and shall have ADA-compliant graphic.

2.03 EXTERIOR SIGNAGE

- A. Building Mounted Letters: Provide individual letter monument mounted sign consisting of molded plastic letters made of Cellulose Acetate Butyrate (CAB) similar and equal to Minnesota letters as manufactured by Gemini Inc.
1. Size and Text shall be as indicated on the drawings. Whether or not indicated on drawings, provide 8" street numbers indicated in Project Address in color selected by Architect from manufacturer's full range to be installed in location selected by Architect.
  2. Color shall be as selected by the Architect from Manufacturer's full range.
  3. Provide mounting hardware to provide 1/2" standoff mounting on indicated substrate. Provide 1" anchored standoff mounting if indicated for installation on masonry surface.
  4. Provide layout template for accurate placement of letters on wall.
- B. Reader Board: Reader Board signage shall consist of a single face non-illuminated sign system of the size shown on the drawings as manufactured by Wagner Zip-Change, Melrose Park, IL, Rankin Signs, H and H signs or approved equal. Sign frame shall consist of bronze anodized aluminum channel slotted on all four sides to accept bolt heads for holding mounting brackets. Sign face shall be corrugated white aluminum with clear acrylic letter tracks to accommodate 5 rows of 6 inch high flat polycarbonate letters. Provide one 300 Font letter and number set with punctuation set in black with suitable letter storage cabinet. Provide all necessary mounting hardware to attach reader board to sign structure.
- C. Post and Panel Site Signs:
1. Handicapped Parking Signs shall be as indicated on drawings. If not indicated, signs shall be RT-8 and R7-8D Type, as required by the ADA, 12" x 18" center post 7' height to bottom of sign. Van accessible space shall have the words "Van Accessible" on the bottom of the sign. Provide and install one sign per accessible parking space.
  2. Aluminum Sheet: Alloy and temper recommended by the aluminum producer and finisher for the type of use and finish indicated, and with at least the strength and durability properties specified in ASTM B 209 for 5005-H15 alloy.
    - a. Panel Material: 0.125-inch- thick aluminum plate.
    - b. Panel Finish: Baked enamel.
    - c. Corner Condition: Corners rounded to 2"radius.
    - d. Surface-Applied, Die-Cut Vinyl Copy: Provide die-cut characters from nonreflective vinyl film with pressure-sensitive adhesive backing. Apply copy to exposed face of sign panel.
  3. Steel Tubing: Cold-formed steel tubing conforming to ASTM A 500, Grade B, hot-dip galvanized after fabrication with a minimum of 2.0 oz. of zinc/sq. ft. of surface area conforming to ASTM A 123.
  4. Vinyl Film: Opaque, nonreflective vinyl film, 0.0035-inch minimum thickness, with pressure-sensitive adhesive backing, suitable for exterior applications.
  5. Colored Coatings for Plastic Sheet: Use nonfading colored coatings, including inks and paints for copy and background colors, which are recommended by the manufacturers for optimum adherence to the type of surface used.
  6. Concrete for Post Holes: Mix Portland cement complying with ASTM C 150, aggregates complying with ASTM C 33, and clean water to obtain concrete with a minimum 28-day compressive strength of 2500 psi. Use at least 4 sacks of cement/cu. yd., 1-inch maximum-size aggregate, maximum 3-inch slump, and 2 to 4 percent entrained air.
  7. Steel Posts: 0.120-inch, galvanized, seamless, square steel posts in length adequate for mounting method specified. Include post caps, fillers, spacers, junction boxes, access panels, and related accessories required for a complete installation. Comply with the following requirements for post shape, finish, and mounting method indicated:
    - a. Post Size: 3 by 3 inches square.
    - b. Post Mounting Method: Provide sign posts of length required for permanent installation by direct-burial mounting method.

PART 3 EXECUTION

3.01 SIGNAGE

- A. Provide and install signage where indicated on drawings.
- B. Whether or not shown on drawings provide and install interior signage in the following locations:
  - 1. At doors into all toilet rooms
  - 2. At doors into stairways
  - 3. At elevator doors
  - 4. At doors indicated as a means of egress.

3.02 INSTALLATION

- A. Locate signs where indicated on the drawings and in strict accordance with ADA regulations.
- B. Install in accordance with manufacturers recommendations.
- C. Installation of Panel and Post Signs:
  - 1. Excavation: In firm, undisturbed or compacted soil, drill or (using a post-hole digger) hand-excavate holes for each post to the minimum diameter recommended by sign manufacturer, but at least 4 times the largest post cross-section.

END OF SECTION



PART 1 GENERAL

1.01 SCOPE

- A Provide all materials, labor, equipment, and supervision necessary to design, fabricate, deliver, and install one dedication plaque as shown on the drawings and as specified herein.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 SUBMITTALS

- A Submit shop drawings in accordance with Section 01 30 00 – Administrative Requirements.
- B The Architect, upon written request from the Contractor, will furnish a schematic layout for the plaque which will include the following information:
- Name of the School
  - Date of Completion
  - Name of Director of Schools
  - Names of School Board Members (8 Board Members)
  - Name of County Mayor
  - Names of County Commissioners (16 County Commissioners)
  - Name of Architect
  - Name of Engineers
  - Name of Contractor
- C Before casting, the Contractor shall submit a full scale rubbing of the proposed plaque layout for approval.

PART 2 PRODUCTS

2.01 MATERIALS

- A Plaque shall be 24 inches by 30 inches cast bronze with lettering (verify Helvetica Medium) on pebble background texture and No. 4 flat band bevel border, as manufactured by ARK Ramos, Gemini, or The Southwell Company.
1. Hidden Fasteners: As recommended for specific substrate and provided by plaque manufacturer.

PART 3 EXECUTION

3.01 INSTALLATION

- A Proposed location shown on drawings. Verify location of new plaque with the Architect at the site prior to installation.
- B Install plaque in accordance with manufacturer's recommendations.

END OF SECTION



PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Cast dimensional characters.
  2. Cutout dimensional characters.
  3. Fabricated channel dimensional characters.
  4. Illuminated, fabricated channel dimensional characters.
  5. Molded-plastic dimensional characters.
  6. Illuminated, molded-plastic dimensional characters.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.03 DEFINITIONS

- A. Illuminated: Illuminated by lighting source integrally constructed as part of the sign unit.

1.04 COORDINATION

- A. Furnish templates for placement of electrical service embedded in permanent construction by other installers.

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For dimensional letter signs.
1. Include fabrication and installation details and attachments to other work.
  2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
  3. Show message list, typestyles, graphic elements, and layout for each sign.
  4. Show locations of electrical service connections.
  5. Include diagrams for power, signal, and control wiring.
- C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
1. Include representative Samples of available typestyles and graphic symbols.
- D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
1. Dimensional Characters: Full-size Sample of each type of dimensional character.
  2. Exposed Accessories: Full-size Sample of each accessory type.
- E. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.
- F. Delegated-Design Submittal: For signs indicated in "Performance Requirements" Article
1. Include structural analysis calculations for signs indicated to comply with design loads; signed and sealed by the qualified professional engineer responsible for their preparation.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Sample Warranty: For special warranty.

1.07 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.08 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer of products or an entity that employs installers and supervisors who are trained and approved by manufacturer.

1.09 FIELD CONDITIONS

- A. Field Measurements: Verify locations of electrical service embedded in permanent construction by other installers by field measurements before fabrication and indicate measurements on Shop Drawings.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
    - a. Deterioration of finishes beyond normal weathering.
    - b. Separation or delamination of sheet materials and components.
  2. Warranty Period: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 DIMENSIONAL LETTER SIGNS, GENERAL

- A. Regional Materials: Dimensional letter signs shall be manufactured within 500 miles (800 km) of Project site.

2.02 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 - Quality Requirements, to design sign structure and anchorage of dimensional character sign type(s) to withstand design loads as indicated on Drawings.
- B. Thermal Movements: For exterior dimensional letter signage, allow for thermal movements from ambient and surface temperature changes.
1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.03 DIMENSIONAL CHARACTERS

- A. Cast Characters: Characters with uniform faces, sharp corners, and precisely formed lines and profiles, and as follows:
1. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
  2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
    - a. ACE Sign Systems, Inc.
    - b. Allen Markings International.
    - c. APCO Graphics, Inc.
    - d. A. R. K. Ramos Signage Systems.
    - e. ASI Sign Systems, Inc.
    - f. Diskey Sign Company.

- g. Gemini Incorporated.
    - h. Matthews International Corporation; Bronze Division.
    - i. Metal Arts; Division of L & H Mfg. Co.
    - j. Metallic Arts.
    - k. Seton Identification Products.
    - l. Southwell Company (The).
    - m. <Insert manufacturer's name>.
  - 3. Character Material: Cast [aluminum] [brass] [bronze] [zinc] <Insert material>.
  - 4. Character Height: [As indicated] <Insert dimension>.
  - 5. Thickness: [As indicated] [Manufacturer's standard for size of character] <Insert dimension>.
  - 6. Finishes:
    - a. Integral Metal Finish: [Mill] [Antique oxidized] [As indicated by manufacturer's designation] [Match Architect's sample] [As selected by Architect from full range of industry finishes] <Insert finish>.
    - b. Integral Aluminum Finish: [Clear anodized] [Light bronze anodized] [Medium bronze anodized] [Match Architect's sample] [Anodized color as selected by Architect from full range of industry colors and color densities] <Insert finish>.
    - c. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard, in color [as indicated by manufacturer's designation] [matching Architect's sample] [as selected by Architect from manufacturer's full range] <Insert color>.
    - d. Overcoat: [Manufacturer's standard baked-on clear coating] [Clear organic coating] <Insert requirement>.
  - 7. Mounting: [As indicated] [Concealed studs] [Projecting studs] [Rosette-head through fasteners] [Countersunk flathead through fasteners] <Insert requirement>.
  - 8. Typeface: [Times Roman] <Insert requirement>.
- B. Cutout Characters: Characters with uniform faces; square-cut, smooth[, eased] edges; precisely formed lines and profiles; and as follows:
- 1. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
  - 2. Basis-of-Design Product: Subject to compliance with requirements, provide [product indicated on Drawings] <Insert manufacturer's name; product name or designation> or comparable product by one of the following:
    - a. ACE Sign Systems, Inc.
    - b. APCO Graphics, Inc.
    - c. A. R. K. Ramos Signage Systems.
    - d. ASI Sign Systems, Inc.
    - e. Charleston Industries, Inc.
    - f. Diskey Sign Company.
    - g. Gemini Incorporated.
    - h. InPro Corporation.
    - i. Matthews International Corporation; Bronze Division.
    - j. Metal Arts; Division of L & H Mfg. Co.
    - k. Metallic Arts.
    - l. Nelson-Harkins Industries.
    - m. Southwell Company (The).
    - n. Steel Art Company.
    - o. <Insert manufacturer's name>.
  - 3. Character Material: Sheet or plate [aluminum] [brass] [bronze] [copper] [stainless steel] [zinc] [acrylic] [acrylic with laminated aluminum facing] [acrylic with laminated brass facing] [acrylic with laminated bronze facing] [acrylic with laminated stainless-steel facing] <Insert material>.
  - 4. Character Height: [As indicated] <Insert dimension>.
  - 5. Thickness: [As indicated] [Manufacturer's standard for size of character] [0.125 inch (3.18 mm)] [0.25 inch (6.35 mm)] <Insert dimension>.
  - 6. Finishes:

- a. Integral Metal Finish: [Mill] [Antique oxidized] [As indicated by manufacturer's designation] [Match Architect's sample] [As selected by Architect from full range of industry finishes] <Insert finish>.
    - b. Integral Aluminum Finish: [Clear anodized] [Light bronze anodized] [Medium bronze anodized] [Match Architect's sample] [Anodized color as selected by Architect from full range of industry colors and color densities] <Insert finish>.
    - c. Integral Stainless-Steel Finish: [No. 4] [No. 8] [Match Architect's sample] [As selected by Architect from full range of industry finishes] <Insert description>.
    - d. Integral Acrylic Color: [As indicated by manufacturer's designation] [Match Architect's sample] [As selected by Architect from full range of industry colors] <Insert color>.
    - e. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard, in color [as indicated by manufacturer's designation] [matching Architect's sample] [as selected by Architect from manufacturer's full range] <Insert color>.
    - f. Overcoat: [Manufacturer's standard baked-on clear coating] [Clear organic coating] <Insert requirement>.
    - g. Painted Edges: Paint edges of acrylic characters with laminated metal facing as recommended in writing by manufacturer.
  7. Mounting: [As indicated] [Concealed studs] [Projecting studs] [Rosette-head through fasteners] [Countersunk flathead through fasteners] [Concealed, painted aluminum back bar or bracket assembly] [Concealed, stainless-steel back bar or bracket assembly] [Adhesive] <Insert requirement>.
  8. Typeface: [Times Roman] <Insert requirement>.
- C. Fabricated Channel Characters: [Metal face and side returns] [Open face with metal side returns] [Translucent face with metal side returns], formed free from warp and distortion; with uniform faces, sharp corners, and precisely formed lines and profiles; internally braced for stability and for securing fasteners; and as follows.
1. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
  2. Basis-of-Design Product: Subject to compliance with requirements, provide [product indicated on Drawings] <Insert manufacturer's name; product name or designation> or comparable product by one of the following:
    - a. ACE Sign Systems, Inc.
    - b. Allen Industries, Inc.; Architectural Division.
    - c. APCO Graphics, Inc.
    - d. A. R. K. Ramos Signage Systems.
    - e. ASI Sign Systems, Inc.
    - f. Diskey Sign Company.
    - g. Gemini Incorporated.
    - h. Metallic Arts.
    - i. Nelson-Harkins Industries.
    - j. Poblocki Sign Company, LLC.
    - k. Steel Art Company.
    - l. <Insert manufacturer's name>.
  3. Illuminated Characters: [Backlighting] [Frontlighting] character construction with [fluorescent tube] [fiber-optic] [LED] [neon tube] <Insert requirement> lighting including transformers, insulators, and other accessories for operability, with provision for servicing and concealing connections to building electrical system. Use tight or sealed joint construction to prevent unintentional light leakage. Space lamps apart from each other and away from character surfaces as needed to illuminate evenly.
    - a. Power: [As indicated on electrical Drawings] [120 V, 60 Hz, 1 phase, 15 A] <Insert requirement>.
    - b. Weeps: Provide weep holes to drain water at lowest part of exterior characters.[ Equip weeps with permanent baffles to block light leakage without inhibiting drainage.]

4. Character Material: Sheet or plate [aluminum] [brass] [bronze] [copper] [steel] [stainless steel] [zinc] <Insert material>.
  5. Material Thickness: [As indicated] [Manufacturer's standard for size and design of character] [0.100 inch (2.54 mm)] [0.032 inch (0.81 mm)] [Nominal 0.048 inch (1.21 mm) thick for face and 0.030 inch (0.76 mm) thick for returns] [0.050 inch (1.27 mm) thick for face and 0.031 inch (0.79 mm) thick for returns] <Insert dimension(s)>.
  6. Translucent Face Sheet: Acrylic sheet, [thickness as indicated] [manufacturer's standard thickness for size of character] [0.125 inch (3.18 mm) thick] [0.25 inch (6.35 mm) thick] <Insert dimension>, and with integral color [matching Architect's sample] [as selected by Architect from manufacturer's full range] <Insert color>.
  7. Character Height: [As indicated] <Insert dimension>.
  8. Character Depth: [As indicated] <Insert dimension>.
  9. Finishes:
    - a. Integral Metal Finish: [Mill] [Antique oxidized] [As indicated by manufacturer's designation] [Match Architect's sample] [As selected by Architect from full range of industry finishes] <Insert finish>.
    - b. Integral Aluminum Finish: [Clear anodized] [Light bronze anodized] [Medium bronze anodized] [Match Architect's sample] [Anodized color as selected by Architect from full range of industry colors and color densities] <Insert finish>.
    - c. Integral Stainless-Steel Finish: [No. 4] [No. 8] [Match Architect's sample] [As selected by Architect from full range of industry finishes] <Insert description>.
    - d. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard, in color [as indicated by manufacturer's designation] [matching Architect's sample] [as selected by Architect from manufacturer's full range] <Insert color>.
    - e. Overcoat: [Manufacturer's standard baked-on clear coating] [Clear organic coating] <Insert requirement>.
  10. Mounting: [As indicated] [Manufacturer's standard for size and design of character] [Projecting studs] [Concealed, painted aluminum back bar or bracket assembly] [Concealed, stainless-steel back bar or bracket assembly] <Insert requirement>.
    - a. Hold characters at [2-inch (51-mm) distance] [manufacturer's recommended distance] [distance as selected by Architect] <Insert dimension> from wall surface.
  11. Typeface: [Times Roman] <Insert requirement>.
- D. Molded-Plastic Characters: [Injection molded] [or] [thermoformed] characters having uniform faces and profiles, and as follows:
1. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
  2. Basis-of-Design Product: Subject to compliance with requirements, provide [product indicated on Drawings] <Insert manufacturer's name; product name or designation> or comparable product by one of the following:
    - a. ACE Sign Systems, Inc.
    - b. ASI Sign Systems, Inc.
    - c. Diskey Sign Company.
    - d. Gemini Incorporated.
    - e. Metallic Arts.
    - f. <Insert manufacturer's name>.
  3. Illuminated Characters: Characters with concealed [fluorescent tube] [fiber-optic] [LED] [neon tube] lighting including transformers, insulators, and other accessories; with provision for servicing and concealing connections to building electrical system. Space lamps apart from each other and away from character surfaces as needed to illuminate evenly.
    - a. Power: [As indicated on electrical Drawings] [120 V, 60 Hz, 1 phase, 15 A] <Insert requirement>.
    - b. Weeps: Provide weep holes to drain water at lowest part of exterior characters.[ Equip weeps with permanent baffles to block light leakage without inhibiting drainage.]

4. Color: Manufacturer's standard [integral color] [painted finish] process, in color [as indicated by manufacturer's designation] [matching Architect's sample] [as selected by Architect from manufacturer's full range] <Insert color>.
5. Typeface: [Times Roman] <Insert requirement>.

#### 2.04 DIMENSIONAL CHARACTER MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M, alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated.
- B. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- D. Brass Castings: ASTM B 584, [alloy recommended by manufacturer and finisher for finish indicated] [lead-free alloy recommended by manufacturer and finisher for finish indicated] [Alloy UNS No. C85200 (high-copper yellow brass)] <Insert requirement>.
- E. Brass Sheet (Yellow Brass): ASTM B 36/B 36M, [alloy recommended by manufacturer and finisher for finish indicated] [lead-free alloy recommended by manufacturer and finisher for finish indicated] [Alloy UNS No. C26000 (yellow brass)] <Insert requirement>.
- F. Bronze Castings: ASTM B 584, [alloy recommended by manufacturer and finisher for finish indicated] [lead-free alloy recommended by manufacturer and finisher for finish indicated] [Alloy UNS No. C86500 (No. 1 manganese bronze)] <Insert requirement>.
- G. Bronze Plate: ASTM B 36/B 36M, [alloy recommended by manufacturer and finisher for finish indicated] [lead-free alloy recommended by manufacturer and finisher for finish indicated] [Alloy UNS No. C22000 (commercial bronze)] <Insert requirement>.
- H. Copper Sheet: ASTM B 152/B 152M.
- I. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, [Type 304,] [Type 316,] stretcher-leveled standard of flatness.
- J. Zinc Castings: ASTM B 240, alloy and temper recommended by sign manufacturer for type of use and finish indicated.
- K. Zinc Sheet: [ASTM B 69] <Insert standard>, alloy and temper recommended by sign manufacturer for type of use and finish indicated.
- L. Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).
- M. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

#### 2.05 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
  1. Use concealed fasteners and anchors unless indicated to be exposed.
  2. For exterior exposure, furnish [nonferrous-metal] [stainless-steel] [or] [hot-dip galvanized] <Insert requirement> devices unless otherwise indicated.
  3. Exposed Metal-Fastener Components, General:
    - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.

- b. Fastener Heads: For nonstructural connections, use [flathead] [or] [oval countersunk] <Insert shape> screws and bolts with tamper-resistant [Allen-head] [spanner-head] [or] [one-way-head] <Insert slot design> slots unless otherwise indicated.
  - 4. Sign Mounting Fasteners:
    - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
    - b. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
    - c. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, installed in predrilled holes.
- B. Adhesives: As recommended by sign manufacturer and with a VOC content of [70] <Insert value> g/L or less for adhesives used inside the weatherproofing system and applied on-site when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Adhesives: As recommended by sign manufacturer and that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

## 2.06 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
  - 1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
  - 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
  - 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
  - 4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
  - 5. Internally brace signs for stability and for securing fasteners.
  - 6. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
  - 7. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.
- B. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.
  - 1. Aluminum Brackets: Factory finish brackets with baked-enamel or powder-coat finish [to match sign-background color] [to match Architect's sample] <Insert requirement> color unless otherwise indicated.
  - 2. Stainless-Steel Brackets: Factory finish brackets [to match sign background] [to match Architect's sample] [with No. 4] <Insert finish> finish unless otherwise indicated.

2.07 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.08 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, [Class I, 0.018 mm] [Class II, 0.010 mm] or thicker.
- B. Color Anodic Finish: AAMA 611, [Class I, 0.018 mm] [Class II, 0.010 mm] or thicker.
- C. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.09 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
  - 1. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
  - 2. Directional Satin Finish: No. 4.
  - 3. Dull Satin Finish: No. 6.
  - 4. Reflective, Directional Polish: No. 7.
  - 5. Mirrorlike Reflective, Nondirectional Polish: No. 8.

2.10 CLEAR ORGANIC COATING FOR COPPER-ALLOY FINISHES

- A. Clear Organic Coating: Clear, waterborne, air-drying, acrylic lacquer called "Incralac"; specially developed for coating copper-alloy products; consisting of a solution of methyl methacrylate copolymer with benzotriazole to prevent breakdown of the film in UV light; shop applied in two uniform coats per manufacturer's written instructions, with interim drying between coats and without runs or other surface imperfections, to a total dry film thickness of 1 mil (0.025 mm).

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 signage work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that electrical service is correctly sized and located to accommodate signs.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
  2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
  3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Mounting Methods:
1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
    - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
    - b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
  2. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
    - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.
    - b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.
  3. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
  4. Back Bar and Brackets: Remove loose debris from substrate surface and install backbar or bracket supports in position so that signage is correctly located and aligned.
  5. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
  6. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

### 3.03 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed characters and signs that do not comply with specified requirements. Replace characters with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.

- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Stainless steel toilet compartments as shown on the drawings and as specified herein.

1.02 RELATED SECTIONS

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 01, General Requirements.

1.03 SUBMITTALS

- A. Submit product data, and shop drawings, in accordance with Section 013300 Submittals. Include details of construction relative to materials, fabrication, installation, anchors, hardware, and fastenings. Provide plans, elevations, details, and attachments to other work.
- B. Field Measurements: Verify dimensions in areas of installation by field measurement before fabrication and indicate measurements on Sop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Toilet compartments shall be the product of Global, Bobrick, American, AMPCO, Mills, Mid-South, All American, Metpar, or Weis.

2.02 MATERIAL

- A. Stainless-Steel Sheet: ASTM A666, Type 302 or 304, that is leveled to stretcher-leveled flatness, finished on exposed faces as indicated in the "Stainless-Steel Finishes" Article, and of the following minimum thicknesses:

Pilasters: 0.0500 inch.

Panels and Screens: 0.0375 inch.

Doors: 0.0312 inch.

Tapping Reinforcement: 0.0781 inch.

- B. Core Material for Metal-Faced Units: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch minimum for doors, panels, and screens and 1-1/4 inches minimum for pilasters
- C. Pilaster Shoes and Sleeves(Caps): ASTM A 666, Type 302 or 304 stainless steel, not less than 0.0312 inch thick and 3 inches high , finished to match hardware.
- D. Full-Height (Continuous) Brackets: Manufacturer's standard design for attaching panels and screens to walls and pilasters of the following material:
1. Stainless Steel
- E. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories of the following material:
1. Stainless Steel

- F. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel finished to match hardware, with theft-resistant heads. **Chrome-plated steel and brass hardware will not be acceptable. Provide sex-type bolts for through-bolt applications. For concealed anchors and fasteners, use stainless steel.**

2.03 FABRICATION

- A. General: Provide standard doors, panels, screens, and pilasters fabricated for compartment system. Provide units with cutouts and drilled holes to receive compartment mounted hardware, accessories, and grab bars, as indicated. Provide internal reinforcement in metal units for compartment-mounted hardware, accessories, and grab-bars, as indicated.
- B. Metal-Faced Toilet Compartments and Screens: Pressure laminate seamless face sheets to core material and provide continuous, interlocking molding strip or lapped and formed edges. Seal corners by welding or clips. Grind exposed welds smooth.
- C. Doors out of compartments with grab bars shall be of a size to allow for a clear opening of 32". All other doors shall be 24" wide.
- D. Overhead-Braced and Floor-Anchored Compartments: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.
- E. Wall-Hung /Screens: Provide units in sizes indicated of same construction and finish as compartment panels, unless otherwise indicated.
- F. Hinges: Manufacturer's standard self-closing type that can be adjusted to hold door open at any angle up to 90 degrees.
- G. Latch and Keeper: Manufacturer's standard surface-mounted latch unit with combination rubber-faced door strike and keeper designed for emergency access. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be handicapped accessible.
- H. Coat Hook: manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment- mounted accessories.
- I. Door Bumper: Manufacturer's standard rubber-tipped bumpers at out-swinging doors or entrance screen doors.
- J. Door Pull: Manufacturer's standard unit that complies with accessibility requirements of authorities having jurisdiction at out-swinging doors. Provide units on both sides of doors at compartments indicated to be handicapped accessible

2.04 STAINLESS-STEEL FINISHES

- A. General: Comply with NAAMM's Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying designating finishes.
- B. Remove or blend tool and die marks and stretch lines into finish.
- C. Grind and polish surfaces to produce uniform, directional textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- D. Finish: Manufacturer's standard No. 3 or No. 4 directional polish.
- E. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

- F. Emboss metal with textured surface to resist scratches and hide streaking.
  - 1. Architect to select texture from manufacturer's full range of available textures.
- G. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

### PART 3 EXECUTION

#### 3.01 INSTALLATION

- A. General: Comply with manufacturer's written instructions. Install units rigid, straight, plumb, and level. Provide clearances of not more than ½ inch between pilasters and panels and not more than 1 inch between panels and walls. Secure units with manufacturer's recommended anchoring devices.
- B. Overhead-Braced and Floor-Anchored Compartments: Secure pilasters to floor and level, plumb., and tighten. Secure continuous head rail to each pilaster with not less than 2 fasteners. Hang doors and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

#### 3.02 ADJUSTING AND CLEANING

- A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold open approximately 20 degrees from closed position when unlatched. Set hinges on out-swing doors to return to fully closed position.
- B. Provide final protection and maintain conditions that ensure toilet compartments and screens are without damage or deterioration at the time of Substantial Completion.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Top-supported folding panel partitions, horizontal opening.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood blocking and track support shimming.
- B. Section 08 71 00 - Door Hardware: Lock cylinders for panels

1.03 REFERENCE STANDARDS

- A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- B. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
- D. ASTM E557 - Standard Guide for Architectural Design and Installation Practices for Sound Isolation between Spaces Separated by Operable Partitions; 2012.
- E. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene at project site seven calendar days prior to scheduled beginning of construction activities of this section to review section requirements.
  - 1. Require attendance by representatives of installer.
  - 2. Notify MBI Companies four calendar days in advance of scheduled meeting date.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on partition materials, operation, hardware and accessories, track switching components, and colors and finishes available.
- C. Shop Drawings: Indicate opening sizes, track layout, details of track and required supports, static and dynamic loads, location and details of pass door and frame, adjacent construction and finish trim, and stacking depth.
- D. Samples for Review: Submit two samples of surface finish, 12 by 12 inches size, illustrating quality, colors selected, texture, and weight.
- E. Certificates: Certify that partition system meets or exceeds specified acoustic requirements.
- F. Manufacturer's Instructions: Indicate special procedures.
- G. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods. Describe cleaning materials detrimental to finish surfaces and hardware finish.

1.06 QUALITY ASSURANCE

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

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until installation.

1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide two year manufacturer warranty against defects in material and workmanship, excluding abuse.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Folding Panel Partitions - Horizontal Opening:
  - 1. Basis of Design: Modernfold, a DORMA Group Company: [www.modernfold.com](http://www.modernfold.com).
  - 2. Substitutions: 01 25 00 - Substitution Procedures.

2.02 FOLDING PANEL PARTITIONS - HORIZONTAL OPENING

- A. Folding Panel Partitions: Center opening; paired panels; side stacking; motor operated.
- B. Panel Construction:
  - 1. Frame: 16 gauge, 0.0598 inch thick formed sheet steel frame top, bottom, jambs, and intermediates; welded construction, with acoustical insulation fill.
  - 2. Substrate: Gypsum board.
  - 3. Panel Substrate Facing: Steel sheet, manufacturer's standard thickness.
  - 4. Hinges: Continuous piano type, stainless steel.
  - 5. Hardware: Latching door handles of cast steel, satin chrome finish; lock cylinder keyed to building keying system; pull bars.
    - a. Refer to Section 08 71 00 for additional requirements.
  - 6. Panel Properties:
    - a. Thickness With Finish: 4 inches.
    - b. Weight: 8 lb/sq ft.
- C. Panel Finishes:
  - 1. Exposed Metal Trim: Custom powder coated paint finish.
- D. Panel Seals:
  - 1. Panel to Panel Seals: Grooved and gasketed astragals, with continuous flexible ribbed vinyl seal fitted to panel edge construction; color to match panel finish.
  - 2. Acoustic Seals: Flexible acoustic seals at jambs, meeting mullions, ceilings, retractable floor and ceiling seals, and above track to structure acoustic seal.
- E. Suspension System:
  - 1. Track: Formed steel; 1-1/4 by 1-1/4 inch size; thickness and profile designed to support loads, steel sub-channel and track connectors, and track switches.
  - 2. Carriers: Nylon wheels on trolley carrier at top of every second panel, sized to carry imposed loads, with threaded pendant bolt for vertical adjustment.
- F. Performance:
  - 1. Fire Rating: UL (FRD) Assembly for one hour rating.
  - 2. Surface Burning Characteristics of Panel Finish: Flame spread/smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.
  - 3. Installed partition system track capable of supporting imposed loads, with maximum deflection of 1/360 of span.
- G. Accessories:
  - 1. Ceiling Closure: White enameled ceiling closure; aluminum jamb and head molding, fittings and attachments, and intermediate meeting posts.
  - 2. Pocket Enclosures: Door, frame, and trim to match adjacent walls.
  - 3. Acoustic Sealant: As recommended by partition manufacturer.

2.03 MATERIALS

- A. Aluminum Extrusions: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify floor flatness of 1/8 inch in 10 feet, non-cumulative.
- C. Verify wall plumbness of 1/8 inch in 10 feet, non-cumulative.

3.02 INSTALLATION

- A. Install partition in accordance with manufacturer's instructions and ASTM E557.
- B. Fit and align partition assembly and pocket doors level and plumb.
- C. Lubricate moving components.
- D. Install acoustic sealant to achieve required acoustic performance.

3.03 ADJUSTING

- A. Adjust partition assembly to provide smooth operation from stacked to full open position. Do not over-compress acoustic seals.
- B. Visually inspect partition in full extended position for light leaks to identify a potential acoustical leak.
- C. Adjust partition assembly to achieve lightproof seal.

3.04 CLEANING

- A. Clean finish surfaces and partition accessories.

3.05 CLOSEOUT ACTIVITIES

- A. Demonstrate operation of partition and identify potential operational problems.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Corner guards.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 - Metal Fabrications: Plates for attachment of work of this section, concealed in wall.
- B. Section 06 10 00 - Rough Carpentry: Blocking for wall and corner guard anchors.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2010, with Editorial Revision (2015).
- C. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents; 2014.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
- E. ASTM F476 - Standard Test Methods for Security of Swinging Door Assemblies; 2014.
- F. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- G. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate physical dimensions, features, wall mounting brackets with mounted measurements, anchorage details, and rough-in measurements.
- C. Shop Drawings: Include plans, elevation, sections, and attachment details. Show design and spacing of supports for protective corridor handrails, required to withstand structural loads.
- D. Samples: Submit samples illustrating component design, configurations, joinery, color and finish.
  - 1. Submit two sections of corner guards, 6 inches long.
  - 2. Submit two samples of protective wall covering and door surface protection, 6 by 6 inches square.
  - 3. Submit two full-size samples of door edge protectors.
- E. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- F. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project:
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Stock Materials: One package(s) of minimum 96 inches long unit of each kind of covers for corner guards, bumper rails, and protective corridor handrails.
- H. Maintenance Data: For each type of product. Include information regarding recommended and potentially detrimental cleaning materials and methods.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wall and door protection items in original, undamaged protective packaging. Label items to designate installation locations.
- B. Protect work from moisture damage.
- C. Protect work from UV light damage.

- D. Do not deliver products to project site until areas for storage and installation are fully enclosed, and interior temperature and humidity are in conformance with manufacturer's recommendations for each type of item.
- E. Store products in either horizontal or vertical position, in conformance with manufacturer's instructions.

#### 1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer and installer warranty for metal crash rails.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures, internal connection failures, and/or detachment of rail system from substrates.
    - b. Deterioration of materials beyond that expected of normal use, as intended by manufacturer.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Corner Guards:
  - 1. Basis of Design: Inpro: [www.inprocorp.com](http://www.inprocorp.com).
  - 2. Babcock-Davis: [www.babcockdavis.com](http://www.babcockdavis.com).
  - 3. Construction Specialties, Inc: [www.c-sgroup.com](http://www.c-sgroup.com).
  - 4. Koroseal Interior Products; G100: [www.koroseal.com](http://www.koroseal.com).
  - 5. Nystrom, Inc: [www.nystrom.com](http://www.nystrom.com).
  - 6. Trim-Tex, Inc: [www.trim-tex.com](http://www.trim-tex.com).
  - 7. Substitutions: 01 25 00 - Substitution Procedures.

#### 2.02 PERFORMANCE CRITERIA

- A. Impact Strength: Unless otherwise noted, provide protection products and assemblies that have been successfully tested for conformance to applicable provisions of ASTM D256 and/or ASTM F476.
- B. Chemical and Stain Resistance: Unless otherwise noted, provide protection products and assemblies with chemical and stain resistance conforming to applicable provisions of ASTM D543.
- C. Fungal Resistance: Unless otherwise noted, provide protection products and assemblies which pass ASTM G21 testing.

#### 2.03 PRODUCT TYPES

- A. Corner Guards - Surface Mounted:
  - 1. Material: High impact vinyl with full height extruded aluminum retainer.
  - 2. Performance: Resist lateral impact force of 100 lbs at any point without damage or permanent set.
  - 3. Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
  - 4. Width of Wings: 1.5 inches.
  - 5. Corner: Square.
  - 6. Color: As selected from manufacturer's standard colors.
  - 7. Length: One piece.
  - 8. Preformed end caps.
- B. Adhesives and Primers: As recommended by manufacturer.
- C. Mounting Brackets and Attachment Hardware: Appropriate to component and substrate.

#### 2.04 FABRICATION

- A. Fabricate components with tight joints, corners and seams.

#### 2.05 SOURCE QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.
- B. Verify that field measurements are as indicated on drawings.
- C. Verify that substrate surfaces for adhered items are clean and smooth.
  - 1. Test painted or wall covering surfaces for adhesion in inconspicuous area, as recommended by manufacturer. Follow adhesive manufacturer's recommendations for remedial measures at locations and/or application conditions where adhesion test's results are unsatisfactory.
- D. Start of installation constitutes acceptance of project conditions.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to supporting construction.
- B. Position corner guard as shown on drawings and finish schedule.

3.03 TOLERANCES

- A. Maximum Variation From Required Height: 1/4 inch.
- B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch.

3.04 CLEANING

- A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- B. Clean wall and door protection items of excess adhesive, dust, dirt, and other contaminants.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Commercial toilet accessories.
- B. Commercial shower accessories.
- C. Molded tub and shower unit.
- D. Under-lavatory pipe supply covers.
- E. Utility room accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 – Rough Carpentry: Concealed supports for accessories, including in wall framing and plates and above ceiling framing.
- B. Section 10 21 13 - Plastic Toilet Compartments.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- C. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015a.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.
- E. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- F. ASTM B86 - Standard Specification for Zinc and Zinc-Aluminum (ZA) Alloy Foundry and Die Castings; 2018.
- G. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium; 2017.
- H. ASTM C1036 - Standard Specification for Flat Glass; 2016.
- I. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- J. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2018.
- K. ASTM C1822 - Standard Specification for Insulating Covers on Accessible Lavatory Piping; 2015.
- L. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
- M. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2004, with Editorial Revision (2016).
- N. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- O. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Commercial Toilet, Shower, and Bath Accessories:
  - 1. Basis of Design: Bradley Corporation: [www.bradleycorp.com](http://www.bradleycorp.com).
  - 2. Substitutions: 01 25 00 - Substitution Procedures.
- B. Under-Lavatory Pipe Supply Covers:
  - 1. IPS Corporation, Collierville, TN; Trubro Lav Guard2:
  - 2. Plumberex Specialty Products, Inc: [www.plumberex.com](http://www.plumberex.com).
  - 3. Substitutions: 01 25 00 - Substitution Procedures.
- C. Diaper Changing Stations:
  - 1. Bradley Corporation: [www.bradleycorp.com](http://www.bradleycorp.com).
  - 2. Diaper Deck & Company: [www.diaperdeck.com](http://www.diaperdeck.com).
  - 3. Basis of Design: Koala Kare Products; KB310-SSRE: [www.koalabear.com](http://www.koalabear.com).
  - 4. Safe-Strap Company, Inc: [www.diaperdepot.com](http://www.diaperdepot.com).
  - 5. Substitutions: 01 25 00 - Substitution Procedures.
- D. Provide products of each category type by single manufacturer.

### 2.02 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
  - 1. Grind welded joints smooth.
  - 2. Fabricate units made of metal sheet of seamless sheets with flat surfaces.
- B. Keys: Provide keys for each accessory to Owner; master key lockable accessories.
- C. Stainless Steel Sheet: ASTM A666, Type 304.
- D. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.
- E. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.
- F. Zinc Alloy: Die cast, ASTM B86.
- G. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.
- H. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.
- I. Adhesive: Two component epoxy type, waterproof.
- J. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof.
- K. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

### 2.03 FINISHES

- A. Stainless Steel: Satin finish, unless otherwise noted.
- B. Chrome/Nickel Plating: ASTM B456, SC 2, satin finish, unless otherwise noted.
- C. Baked Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats epoxy baked enamel.
- D. Powder-Coated Steel: Clean, degrease, and neutralize. Follow immediately with a phosphatizing treatment, prime coat, and two finish coats of powder coat enamel.

- E. Galvanizing for Items Other than Sheet: Comply with ASTM A123/A123M; galvanize ferrous metal and fastening devices.
- F. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake.
- G. Back paint components where contact is made with building finishes to prevent electrolysis.

#### 2.04 COMMERCIAL TOILET ACCESSORIES

- A. Toilet Paper Dispenser: Double roll, surface-mounted, stainless steel unit with shelf.
  - 1. Products:
    - a. Bradley; Model 5263.
    - b. Substitutions: 01 25 00 - Substitution Procedures.
- B. Paper Towel Dispenser: Folded paper type, stainless steel, surface-mounted, with viewing slot as refill indicator.
  - 1. Capacity: 525 multi-fold or 400 C-fold minimum.
  - 2. Products:
    - a. Bradley; Model 250-15 Towel Dispenser.
- C. Automated Soap Dispenser: Foam soap/sanitizer dispenser, wall-mounted, with stainless steel cover and window to gauge soap level, tumbler lock.
  - 1. Minimum Capacity: 27 ounces.
  - 2. Products:
    - a. Bradley; Model 6A01.
    - b. Substitutions: 01 25 00 - Substitution Procedures.
- D. Mirrors: Frameless, 1/4 inch thick annealed float glass; ASTM C1036.
  - 1. Annealed Float Glass: Silvering, protective and physical characteristics in compliance with ASTM C1503.
  - 2. Size: 24 inches x 36 inches.
  - 3. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
  - 4. Products:
    - a. Bradley; Model 747-024260.
    - b. Substitutions: 01 25 00 - Substitution Procedures.
- E. Grab Bars: Stainless steel, smooth surface.
  - 1. Standard Duty Grab Bars:
    - a. Push/Pull Point Load: 250 pound-force, minimum.
    - b. Dimensions: 1-1/2 inch outside diameter, minimum 0.05 inch wall thickness, concealed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
    - c. Finish: Satin.
    - d. Length and Configuration: As indicated on drawings.
    - e. Products:
      - 1) Bradley; 812 Series.
      - 2) Substitutions: 01 25 00 - Substitution Procedures.
- F. Sanitary Product Disposal Unit: Stainless steel, surface-mounted, self-closing door, with full-length stainless steel piano-type hinge, removable paper liner.
  - 1. Products:
    - a. Bradley; Model 4A10.
    - b. Substitutions: 01 25 00 - Substitution Procedures.

#### 2.05 COMMERCIAL SHOWER ACCESSORIES

- A. Shower Curtain Rod: Stainless steel tube, 1-1/4 inch outside diameter, 0.04 inch wall thickness, satin-finished, with 3 inch outside diameter, minimum 0.04 inch thick satin-finished stainless steel flanges, for concealed mounting.
  - 1. Products:
    - a. Bradley; Model 9539.
    - b. Substitutions: 01 25 00 - Substitution Procedures.

- B. Shower Curtain:
  - 1. Material: Opaque vinyl, 0.008 inch thick, matte finish, with antibacterial treatment, flameproof and stain-resistant.
  - 2. Size: 72 by 72 inches, hemmed edges.
  - 3. Grommets: Stainless steel; pierced through top hem on 6 inch centers.
  - 4. Color: White.
  - 5. Shower Curtain Hooks: Chrome-plated or stainless steel spring wire designed for snap closure.
    - a. Basis of Design: Bradley; Model 9540 with rollers.
  - 6. Products:
    - a. Bradley; Model 9533.
    - b. Substitutions: 01 25 00 - Substitution Procedures.
- C. Folding Shower Seat: Wall-mounted surface; welded tubular seat frame, structural support members, stainless steel support bracket, hinges, and mechanical fasteners of Type 304 stainless steel, reversible in field to be right or left hand seat.
  - 1. Seat: Phenolic or polymeric composite one-piece seat or seat slats, of color as selected.
  - 2. Size: ADA Standards compliant.
  - 3. Products:
    - a. Bradley; Model 9569.
    - b. Substitutions: 01 25 00 - Substitution Procedures.
- D. Wall-Mounted Soap Dish: Normal duty, seamless stainless steel, recessed, without grab bar, satin finish; with concealed mechanical fastening suitable for substrate .
  - 1. Products:
    - a. Bradley; Recessed Soap Dish (RSD).
    - b. Substitutions: 01 25 00 - Substitution Procedures.
- E. Towel Bar: Stainless steel, 3/4 inch square tubular bar; rectangular brackets, concealed attachment, satin finish.
  - 1. Length: 24 inches.
  - 2. Products:
    - a. Bradley; Model 9054.
    - b. Substitutions: 01 25 00 - Substitution Procedures.
- F. Robe Hook: Heavy-duty stainless steel, single-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish.
  - 1. Products:
    - a. Bradley; Model 9114.
    - b. Substitutions: 01 25 00 - Substitution Procedures.

## 2.07 MOLDED TUB AND SHOWER UNIT

- A. Products:
  - 1. Sterling, a Kohler Company; Traverse 60 inch x 32 inch Vikrell bath/shower with Aging in Place backerboards, left drain, model 71520116; [www.sterlingplumbing.com](http://www.sterlingplumbing.com).
  - 2. Substitutions: 01 25 00 - Substitution Procedures.

## 2.08 UNDER-LAVATORY PIPE AND SUPPLY COVERS

- A. Under-Lavatory Pipe and Supply Covers:
  - 1. Insulate exposed drainage piping, including hot, cold, and tempered water supplies under lavatories or sinks to comply with ADA Standards.
  - 2. Exterior Surfaces: Smooth non-absorbent, non-abrasive surfaces.
  - 3. Construction: 1/8 inch flexible PVC.
    - a. Surface Burning Characteristics: Flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
    - b. Comply with ASTM C1822, type indicated.
    - c. Comply with ICC A117.1.
    - d. Microbial and Fungal Resistance: Comply with ASTM G21.

4. Color: White.
5. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces.
6. Products:
  - a. IPS Corporation; Trubro Lav Guard.
  - b. Substitutions: 01 25 00 - Substitution Procedures.

#### 2.09 UTILITY ROOM ACCESSORIES

- A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
  1. Hooks: Four, 0.06 inch stainless steel rag hooks.
  2. Mop/broom holders: Three spring-loaded rubber cam holders.
  3. Length: Manufacturer's standard length for number of holders/hooks.
  4. Products:
    - a. Bradley; Model 9933.
    - b. Substitutions: 01 25 00 - Substitution Procedures.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. Verify that field measurements are as indicated on drawings.
- D. See Section 06 10 00 – Rough carpentry for installation of blocking, reinforcing plates, and concealed anchors in walls and ceilings.

#### 3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

#### 3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.
  1. Grab Bars: As indicated on drawings.
  2. Mirrors: 40 inch, measured from floor to bottom of mirrored surface.
  3. Other Accessories: As indicated on drawings.

#### 3.04 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.

1.03 REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems.
- B. FM (AG) - FM Approval Guide; current edition.
- C. NFPA 10 - Standard for Portable Fire Extinguishers.
- D. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide extinguisher operational features.
- C. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.
- D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.05 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Extinguishers:
  - 1. Amerex: [www.amerex-fire.com](http://www.amerex-fire.com).
  - 2. Ansul, a Tyco Business: [www.ansul.com](http://www.ansul.com).
  - 3. Larsen: [www.larsensmfg.com](http://www.larsensmfg.com).
  - 4. Substitutions: 01 25 00 - Substitution Procedures.
- B. Fire Extinguisher Cabinets and Accessories:
  - 1. Activar Construction Products Group - JL Industries: [www.activarcpg.com](http://www.activarcpg.com).
  - 2. Ansul, a Tyco Business: [www.ansul.com](http://www.ansul.com).
  - 3. Larsen's Manufacturing Co: [www.larsensmfg.com](http://www.larsensmfg.com).
  - 4. Substitutions: 01 25 00 - Substitution Procedures.

2.02 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
  - 1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
- B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
  - 1. Class: A:B:C type.

2. Size: 10 pound.
3. Finish: Baked polyester powder coat, red color.
4. Temperature range: Minus 65 degrees F to 120 degrees F.

C. Dry Chemical Type Fire Extinguishers: Stainless steel tank, with pressure gauge.

1. Class: K type.
2. Size: 1.6 gallons.
3. Finish: Baked polyester powder coat, red color..
4. Temperature range: Minus 20 degrees F to 120 degrees F.

2.03 FIRE EXTINGUISHER CABINETS

- A. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.
- B. Cabinet Construction: Non-fire rated.
  1. Formed aluminum; 0.036 inch thick base metal.
- C. Fire Rated Cabinet Construction: One-hour fire rated.
  1. Steel; double wall or outer and inner boxes with 5/8 inch thick fire barrier material.
- D. Cabinet Configuration: Surface mounted type.
  1. Size to accommodate accessories.
  2. Trim: Flat rolled edge, with 1 1/2 inch wide face.
- E. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with roller type catch. Hinge doors for 180 degree opening with two butt hinge.
- F. Door Glazing: Acrylic plastic, clear, 1/8 inch thick, flat shape and set in resilient channel glazing gasket.
- G. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
- H. Weld, fill, and grind components smooth.
- I. Finish of Cabinet Exterior Trim and Door: Clear anodized aluminum.
- J. Finish of Cabinet Interior: White colored enamel.

2.04 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, chrome-plated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install cabinets plumb and level, 48 inches from finished floor to highest operable part.
- C. Secure rigidly in place.
- D. Place extinguishers in cabinets.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Premanufactured coat rack system.

1.02 RELATED REQUIREMENTS

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.
- B. Section 04 20 00 – Unit Masonry: CMU substrate for coat rack system.
- C. Section 06 10 00 - Rough Carpentry: Blocking in walls for attachment of coat rack system.
- D. Section 09 21 16 - Gypsum Board Assemblies: Blocking in metal stud walls for attachment of standards or mounting rails.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, with installation instructions.
- C. Finish Samples: Submit samples of manufacturer's full range of mounting board finishes available for selection by Architect.
- D. Shop Drawings: Provide drawings prepared specifically for this project; show dimensions of coat rack system and attachment to substrates.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in manufacturer's original sealed and labeled containers; inspect to verify acceptability. Containers are to arrive unopened.

1.05 WARRANTY

- A. Provide manufacturer's lifetime warranty for products specified in this Section.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Product: HangSafe Hooks; [www.hangsafehooks.com](http://www.hangsafehooks.com).
  - 1. Substitutions: See Section 01 25 00 – Substitution Procedures.

2.02 MATERIALS

- A. Hooks: polycarbonate plastic with rounded ends, eased edges, and polished surface.
  - 1. Number each hook if shown on drawings.
- B. Mounting Board:
  - 1. Solid oak finished with stain, as selected by Architect, and two coats clear polyurethane.

- C. Fasteners: Hooks attach to mounting board with No. 14 x 2 inch stainless steel Phillips oval head screws and finishing washers.

2.03 FABRICATION

- A. Assembly: Shop finish and assemble units with pre-drilled holes for mounting to substrate.

PART 3 EXECUTION

2.04 EXAMINATION

- A. Verify adequacy of backing and support framing.

2.05 INSTALLATION

- A. Install work in accordance with manufacturer's written instructions.
- B. Install racks level, with mounting screws or mounting system (provided per wall type) and ¼ inch flat washers in the ¾ inch diameter mounting pockets. Tighten screws/bolts to eliminate all movement in rack system.
- C. Glue oak wood finishing button in mounting pocket.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

- A Furnish all materials, labor, equipment, and supervision necessary to design, fabricate, provide and install pre-engineered, aluminum entry canopies as specified herein and as shown on the drawings.
1. Include storm water collection and drainage to grade.
  2. Include accommodation of electrical amenities as indicated on the drawings.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

Section 03 30 00 – Cast-in-Place Concrete

1.03 QUALITY ASSURANCE

- A Canopy shall be wholly produced by a recognized manufacturer with at least five years experience in the design and fabrication of extruded aluminum walkway cover systems.
- B Components shall be assembled in shop to greatest extent possible to minimize field assembly.

1.04 FIELD MEASUREMENTS

- A Confirm dimensions prior to preparation of shop drawings when possible.

1.05 SUBMITTALS

- A Submit shop drawings and manufacturer's cut sheets showing structural component locations/positions, material dimensions and details of construction and assembly.
- B Submit drawing showing configuration of canopy installation including column locations and drainage locations.
- C Provide load calculations stamped by a structural engineer licensed in the jurisdiction where the canopy will be erected.

1.06 PERFORMANCE REQUIREMENTS

- A Canopy must conform to local building codes.
- B Comply with specific load requirements established on the structural drawings.
- C Comply with the load requirements of electrical devices indicated on drawings, if any.

PART 2 PRODUCTS

2.01 MATERIALS

- A All materials for canopy shall be provided and assembled by a manufacturer specializing in the production and assembly of a prefinished aluminum canopy structures.
- B Subject to compliance with these specifications, acceptable products shall be those of Mason Corporation, Birmingham AL manufacturers include but are not limited to:
1. Extruded Super Lumideck Aluminum Canopy System as manufactured by: Mapes Industries, Inc., P.O. Box 80069, Lincoln, NE 68504, 800-228-2391, Fax: 800-737-6756
  2. Ditt-Deck Aluminum Canopy System as manufactured by: Dittmer Architectural Aluminum, 1006 Shepard Rd, Winter Springs, FL, 800-822-1755, Fax: 407-695-4430

3. Extruded Aluminum Canopy as manufactured by: Peachtree Protective Covers, Inc., 1477 Rosedale Drive, Hiram, GA 30141, 800-341-3325, fax 770-439-2122
4. Extruded Superdeck Canopy as manufactured by: Rusco Custom Canopies, 6808 Barger Pond Way, Knoxville, TN, 865-938-4717, Fax: 877-798-3183
5. Extruded Aluminum Entrance as manufactured by: Tennessee Valley Metals, Inc., 190 Industrial Park Road, Oneonta, AL 35121, 800-551-2579, Fax: 205-274-9501
6. Commercial Extruded Aluminum Canopy System as manufactured by Mason Corporation, 1487 Amherst Rd., Suite B, Knoxville, TN 37909, 800-961-6266

## 2.02 DESIGN

- A Protective cover shall be all welded extruded aluminum system complete with internal drainage. Non-welded systems are not acceptable. Roll formed deck is not acceptable.
- B Aluminum Members: All sections shall be extruded aluminum 6063 alloy, heat treated to T-6 temper.
- C Fasteners: Fasteners shall be aluminum, 18-8 stainless steel or 300 series stainless steel
- D Protective Coating: Aluminum columns embedded in concrete shall be protected by clear acrylic.
- E Grout: Grout shall be 2000 psi compressive strength, 1 part Portland cement and 3 parts masonry sand. Add water to produce pouring consistency.
- F Gaskets: Gaskets shall be dry seal santoprene pressure type.
- G Fascia shall be .125 inch prefinished aluminum extruded Fascia panel.
- H Roof panels shall be prefinished extruded aluminum panel presenting a smooth flush lower surface. Deck shall be sized for spans indicated.

## 2.03 COMPONENTS

- A Columns: Columns shall be radius-cornered tubular extrusion of size required for configuration shown on the drawings with cutout and internal diverter for drainage where indicated. Circular downspout opening in column not acceptable.
- B Beams: Beams shall be open-top tubular extrusion of size and shape required for configuration shown on drawings, top edges thickened for strength and designed to receive deck members in self-flashing manner. Structural ties shall be installed in tops of all beams.
- C Deck: Deck shall be 3" .078" extruded aluminum flat soffit self-flashing sections interlocking into a composite unit. Closures at deck ends shall be welded plates.
- D Fascia: Fascia shall be manufacturer's standard shape. Size as required for configuration shown on drawings.
- E Flashing: Flashing shall be .040 aluminum (min.). All thru-wall flashing by others.
- F Arches: Arches for barrel vault protective covers shall be sharp-cornered tubular extrusions of size shown in drawings.

## 2.04 FABRICATION

- A Bent Construction: Beams and columns shall be factory welded with neatly mitered corners into one-piece rigid bents. All welds shall be smooth and uniform using an inert gas shielded arc. Suitable edge preparation shall be performed to assure 100% penetration. Grind welds only where interfering with adjoining structure to allow for flush connection. Field welding is not permitted. Rigid mechanical joints shall be used when shipping limitations prohibit the shipment of fully welded bents.

- B Deck Construction: Deck shall be manufactured of extruded modules that interlock in a self-flashing manner. Interlocking joints shall be positively fastened at 8" O.C. creating a monolithic structural unit capable of developing the full strength of the sections. The fastenings must have minimum shear strength of 350 pounds each. Deck shall be assembled with sufficient camber to offset dead load deflection.

2.05 FACTORY FINISHING

- A Type: flouropolymer (Kynar) finish, AAMA 605.2, two coat.
- B Color: To be selected from manufacturer's full range (of no less than twenty) colors.

PART 3 EXECUTION

3.01 PREPARATION

- A Erection shall be performed after all concrete, masonry, and roofing work in the vicinity is complete and cleaned.

3.02 INSTALLATION

- A Installation of canopy shall be performed by approved installers according to approved shop drawings
- B Column Sleeves: Column sleeves (styrofoam blockouts) or anchor bolts (if required) shall be furnished by Peachtree Protective Covers, Inc. and installed by the General Contractor.
- C Erection: Protective cover shall be erected true to line, level and plumb. Aluminum columns embedded in concrete shall be protected by clear acrylic. Downspout columns shall be filled with grout to the discharge level to prevent standing water. Non-draining columns shall have weep holes installed at top of concrete to remove condensation.

3.03 CLEANING

- A All protective cover components shall be cleaned promptly after installation.

3.04 PROTECTION

- A Care shall be taken to protect materials during and after installation.

END OF SECTION



## PART 1 GENERAL

### 1.01 SCOPE

- A Pre-engineered, hanger rod supported aluminum entry canopies.
- B Flashing to supporting wall.
- C Storm water collection and drainage to grade.
- D Accommodation of electrical amenities as indicated on drawings.

### 1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

### 1.03 QUALITY ASSURANCE

- A Canopy shall be wholly produced by a recognized manufacturer with at least five years experience in the design and fabrication of extruded aluminum walkway cover systems.
- B Components shall be assembled in shop to greatest extent possible to minimize field assembly.

### 1.04 FIELD MEASUREMENTS

- A Confirm dimensions prior to preparation of shop drawings.

### 1.05 SUBMITTALS

- A Submit shop drawings and manufacturer's cut sheets showing structural component locations/positions, material dimensions and details of construction and assembly.
- B Submit drawing showing configuration of canopy installation including column locations and drainage locations.
- C Provide load calculations stamped by a structural engineer licensed in the jurisdiction where the canopy will be erected.

### 1.06 PERFORMANCE REQUIREMENTS

- A Canopy must conform to local building codes.
- B Comply with specific load requirements established for canopies as shown on the drawings.
- C Comply with the load created by electrical devices indicated on drawings, if any.

## PART 2 PRODUCTS

### 2.01 PERFORMANCE REQUIREMENTS

- A. System Performance: Provide aluminum canopy system that has been designed, produced, fabricated and installed to withstand normal temperature changes as well as live loading, dead loading and wind loading in compliance with local building code requirements for geographic area in which work is located and as indicated on the drawings.
  - 1. Refer to structural drawings for structural loading criteria including design wind velocity, live load, importance factors, structural requirements for wind forces and stability criteria.

- B. Structure shall be capable of sustaining severe icing, hail, hurricane force winds and supporting a concentrated load such as being walked upon.

## 2.02 MATERIALS

- A All materials for canopy shall be provided and assembled by a manufacturer specializing in the production and assembly of a prefinished aluminum canopy structures.
- B Subject to compliance with these specifications, acceptable products shall include but are not limited to:
1. Extruded Super Lumideck Aluminum Canopy System as manufactured by: Mapes Industries, Inc., P.O. Box 80069, Lincoln, NE 68504, 800-228-2391, Fax: 800-737-6756
  2. Ditt-Deck Aluminum Canopy System as manufactured by: Dittmer Architectural Aluminum, 1006 Shepard Rd, Winter Springs, FL, 800-822-1755, Fax: 407-695-4430
  3. Extruded Aluminum Canopy as manufactured by: Peachtree Protective Covers, Inc., 1477 Rosedale Drive, Hiram, GA 30141, 800-341-3325, fax 770-439-2122
  4. Extruded Superdeck Canopy as manufactured by: Rusco Custom Canopies, 6808 Barger Pond Way, Knoxville, TN, 865-938-4717, Fax: 877-798-3183
  5. Extruded Aluminum Entrance as manufactured by: Tennessee Valley Metals, Inc., 190 Industrial Park Road, Oneonta, AL 35121, 800-551-2579, Fax: 205-274-9501

## 2.03 DESIGN

- A Canopy shall be all welded extruded aluminum system complete with internal drainage. Non-welded systems are not acceptable. Roll formed deck is not acceptable.
- B Aluminum Members: All sections shall be extruded aluminum 6063 alloy, heat treated to T-6 temper.
- C Fasteners: Fasteners shall be aluminum, 18-8 stainless steel or 300 series stainless steel
- D Protective Coating: Aluminum columns embedded in concrete shall be protected by clear acrylic.
- E Grout: Grout shall be 2000 psi compressive strength, 1 part Portland cement and 3 parts masonry sand. Add water to produce pouring consistency.
- F Gaskets: Gaskets shall be dry seal santoprene pressure type.
- G Fascia shall be .125 inch prefinished aluminum extruded aluminum fascia panel.
- H Roof panels shall be .078 inch prefinished aluminum.
- I System shall accommodate electrical fixtures/devices if shown on the architectural or electrical drawings. Refer to the drawings for device type(s), quantity, location and mounting height/method. Accommodations shall allow for mounting which does not penetrate water-transferring components. Conduit to all devices, whether or not shown on the drawings, shall be fully concealed. The installation of fixtures/devices shall have no effect on the manufacturer's warranty.

## 2.04 COMPONENTS

- A Deck shall be 3" extruded .078" self-flashing sections interlocking into a composite unit with flush bottom surface. Closures at deck ends shall be welded plates.
- B Fascia: Fascia shall be manufacturer's standard 8" extruded "J" style, .125" thick minimum.. Flashing: Flashing shall be .040 aluminum (min.). All thru-wall flashing by others.
- C Hanger rods and attachment hardware shall be powder coated to match canopy.

2.05 FABRICATION

- A Bent Construction: Beams and columns shall be factory welded with neatly mitered corners into one-piece rigid bents. All welds shall be smooth and uniform using an inert gas shielded arc. Suitable edge preparation shall be performed to assure 100% penetration. Grind welds only where interfering with adjoining structure to allow for flush connection. Field welding is not permitted. Rigid mechanical joints shall be used when shipping limitations prohibit the shipment of fully welded bents.
- B Deck Construction: Deck shall be manufactured of extruded modules that interlock in a self-flashing manner. Interlocking joints shall be positively fastened at 8" O.C. creating a monolithic structural unit capable of developing the full strength of the sections. The fastenings must have minimum shear strength of 350 pounds each. Pre-welded or factory-welded connections are not acceptable. Deck shall be assembled with sufficient camber to offset dead load deflection.
- C Concealed drainage: Water shall drain from covered surfaces into integral fascia gutter and directed to the rear for ground level discharge via one or more designated downspouts.

2.06 FACTORY FINISHING

- A Type: Fluoropolymer (Kynar) finish, AAMA 605.2, two coat
- B Color: To be selected from manufacturer's full range (of no less than twenty) colors.

PART 3 EXECUTION

3.01 PREPARATION

- A Erection shall be performed after all concrete, masonry, and roofing work in the vicinity is complete and cleaned.

3.02 INSTALLATION

- A Installation of canopy shall be performed by approved installers according to approved shop drawings
- B Erection: Protective cover shall be erected true to line, level and plumb. deck framing shall be anchored to filled CMU cells. Hanger rods shall be through bolted to support wall. Install all necessary flashing and sealants as required for a weatherproof connection to supporting construction.

3.03 CLEANING

- A All protective cover components shall be cleaned promptly after installation.

3.04 PROTECTION

- A Care shall be taken to protect materials during and after installation.

END OF SECTION



PART 1 GENERAL

1.01 SCOPE

- A Ground set flagpoles.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions, and Division 1, General Requirements, apply to the work under this section.

1.03 SUBMITTALS

- A Submit Shop product data sheets showing configuration and construction of proposed flagpoles.

PART 2 PRODUCTS

2.01 MATERIALS

- A Manufacturer: Flagpole shall be ground set type as manufactured by the Baartol Company, American Flagpole and Equipment Company, the Lingo Flagpole Company or approved equal.
- B Pole: Pole shall be cone tapered aluminum pole made of 6063-T6 seamless extruded aluminum tubing with a minimum wall thickness of .188 inches. Taper shall be uniform throughout the tapered portion at a rate of 1 inch in 6 feet 4 inches.
- C Exposed height of pole shall be 30 feet. Butt diameter of pole shall be 6 inches. Top diameter of pole shall be 3 ½ inches. Finish shall be Satin Brushed Aluminum with a minimum .0010 inch coating of wax.
- D Fittings: Provide poles with 10 inch diameter ball and truck assembly halyards, cleats, foundation tube and spun aluminum flash collar.
- E Accessories: Provide all necessary accessories for complete mounting and lightning protection.

PART 3 EXECUTION

3.01 INSTALLATION

- A Pole shall be designed and installed to withstand winds of 90 mph unflagged.
- B Install poles as recommended by the manufacturer and in accordance with the drawings.

END OF SECTION



## **SECTION 11 40 00 – FOOD SERVICE EQUIPMENT**

### **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 DESCRIPTION**

- A. All General Provisions and Sections of the Project Manual, including the AIA General Conditions and Supplementary Conditions & General Requirements; all bidding documents including the Architectural Specifications, Itemized Specifications, Bidding Requirements, Conditions of the Contract, the Contract Documents, all drawings, all Addenda issued and all applicable Divisions of the Architect's Project Manual apply to all the work specified under this Section. Bidder shall examine all other sections and all other drawings including mechanical and electrical drawings for discrepancies and/or conflicts. It is the responsibility of Food Service Equipment Bidder to obtain access to these Project Manuals and drawings.
- B. Each Bidder shall examine the bidding documents carefully and, not later than five (5) days prior to the date for receipt of bids, shall make written request to the Architect for the intent or true meaning of any part of the Contract Documents, or for interpretation or correction of any ambiguity, inconsistency, conflict, discrepancy, omission and/or error that he may discover. Any interpretation, clarification, information, amendment and/or correction is issued as a written Addendum by the Architect. Only a written interpretation or correction by Addendum is binding. No bidder shall rely upon any interpretation or correction given by any other method. Architect will not be responsible for oral interpretations or instructions. Addenda are incorporated, by reference, into the contract. Failure by any bidder to receive any addendum shall not relieve the bidder of any obligation and it is the sole responsibility of each bidder to insure that he has received all addenda. Bidder shall familiarize himself with the site, a complete set of Drawings and Specifications and planned conditions and service connections; his failure to do so shall in no way relieve him of responsibility and no claims for extras shall be allowed in his behalf for failure to do so. Each bidder by submitting his Proposal represents that he has read and understands all the provisions of the Project Manual. Should discrepancies and/or conflicts be discovered after the work has started, the Contractor shall report them to the Architect immediately, and no work connected with the discrepancies and/or conflicts shall be undertaken; or if underway, such work shall be stopped immediately until the Contractor and the Architect agree on the clarification thereof.
- C. If there is any conflict within or between any of the Bidding Documents involving the quality or quantity of work required, it is the intention of the Contract that the work of highest quality, greatest quantity, and greatest expense shown or specified shall be furnished. Whether or not the word "all" is used in the specification, coverage is intended to be complete, except where partial coverage is specifically and expressly noted. In all cases where an item is referred to in the singular number, it is intended that the reference shall apply to as many such items as are required to complete the work.
- D. Each bidder shall visit the site of the Work and/or review all applicable project drawings. Each

bidder shall fully inform himself prior to bidding of the conditions and limitations under which the Work is to be performed. He shall include in his bid a sum to cover all costs in order to perform the Work as related to the conditions and limitations. No allowance will be made to any bidder because of lack of such examining knowledge. The submission of a bid will be construed as conclusive evidence that the bidder has made such examination.

### 1.3 PROJECT FORMS

- A. Forms used on this Project (not inclusive) are AIA documents outlined in the Architectural specifications.
- B. Within forty-eight (48) hours after written or verbal notification from the Architect or his authorized representative has been received by the General Contractor/Food Service Equipment Contractor, an itemized cost for the food service equipment shall be submitted to the Architect and his Food Service Consultant. With the itemized cost, the Food Service Equipment Contractor is required to identify each items manufacturer and model number as based on the itemized equipment specifications and all addenda. Any applicable bond amounts are entered separately.

### 1.4 BIDDER RESPONSIBILITY

- A. Bidders shall carefully examine the contract and conditions therein affecting work and procedure prior to submitting bids for which contract will be binding.
- B. Bonding and Insurance requirements are given in another section of the Project Manual.
- C. Instructions for completion of Schedule of Value, Payment Request, etc., are found in a preceding section and are the standard AIA procedure as modified by the Architect.
- D. In addition to the progress schedule required by the AIA General Conditions, the Food Service Equipment Contractor also submits his proposed scheme of work for approval, describing proposed sequences of work from beginning to completion of the Work and their correlation with the Owner's specific requirements. Equipment is not delivered, removed from the crates, set-in-place until as a minimum all painting has been completed; ceilings, hood and ventilation duct work are in place; floor is acid cleaned (IF APPROPRIATE); all rough-in connections are in place. Site must be ready for final connections.

### 1.5 SCOPE OF WORK

- A. The work covered by this Section includes the following:
  - 1. Furnishes all food service equipment shown, including all labor, materials, tools and equipment necessary for the complete installation of kitchen equipment and refrigeration in a first-class manner, including all work incidental thereto in accordance with the drawings and these specifications.
  - 2. Provide superintendent who, shall be devoted full time to this project during installation, shall be available to the other trades for verification of connection location, "etc." as needed, and shall direct, coordinate and supervise all work associated with this Section and inspects all equipment provided under this Section.
  - 3. Provide equipment with threaded outlets for type of connections as standardized by Food Service Equipment Manufacturers for other contractors to make final steam, plumbing, electric and ventilating connections.

4. Provide all labor and material necessary to adequately insulate and seal any and all penetrations in Food Service Equipment. All penetrations are to be insulated and sealed properly to prevent condensation on inside of boxes.
5. Erect the equipment at the site in full compliance with all current local, state and Federal rules, regulations and codes.
6. Attend construction meetings and any other scheduled meetings as necessary to maintain coordination related to this Section.
7. Provide coordination of Food Service Equipment shop drawings, submittal data and installation activities, as required and identified in Division 1 Section "Project Management and Coordination"
8. All labor is to be performed in the best and most workmanlike manner. The standards of the work required are of such grade as will bring first class results. Materials and/or workmanship not in compliance with the drawings and specifications or are improperly installed shall be removed and replaced with no change in contract price or other cost to the Owner.
9. Cleans up all debris resulting from the work of this Section immediately upon completion of installation and removes same from premises.
10. Field verify all measurements on-site (including shelving); verify the placement of pipes, sleeves, hood, pant-leg duct, drains, power, and walk-in wood breaker strip locations prior to the pouring of the floor slab or, if in an existing facility, prior to the installation of such services. Any modification necessary to the equipment because of the location of service connections must be brought to the attention of the Architect immediately for approval if the modifications require design changes. Measurements shown on drawings are approximate and are for estimating purposes only. Verify all electrical and mechanical requirements for all new, existing and future equipment with all appropriate trades, consultants, and engineers. Supplier of Food Service Equipment must examine roughed-in mechanical and electrical services. Notify the General Contractor in writing of unsatisfactory locations and dimensions of other work, and of unsatisfactory conditions for proper installation of Food Service Equipment. Do not proceed with fabrication or installation until unsatisfactory dimensions and conditions have been corrected. Any costs related to the failure of performing this function will not be borne by the Owner.
11. Verify all plug types and lengths of all cord and plug sets on equipment for which it is supplied. All cord sets are to contain an equipment grounding conductor and be furnished with caps or plugs listed or recognized by Underwriter's Laboratories.
12. Confer with the General Contractor on all measurements, location and measurement of recesses and openings, verification of all connection requirements, etc.; coordinate with the General Contractor the scheduling and transfer of all pertinent information (measurements, drawings, connection data, etc.) to other trades who will be involved in the work associated with this Section.

B. Related Sections include the following:

1. Division 1 Section "Submittal Procedures" for submittal preparation and coordination.
2. Division 1 Section "Project Management and Coordination".
3. Division 22 for Plumbing/Piping Work
4. Division 23 for Ventilation Work requirements.
5. Division 26 for Electrical requirements

## 1.2 DEFINITIONS

- A. The term "Complete Installation" means the delivery of all kitchen equipment and refrigeration, with transportation and trucking charged prepaid to the building site, removal from crates, assembled, set in place, leveled, ready for final connection, re-leveled, calibrated, started-up and

adjusted, cleaned, demonstrated, with Owner Training complete. All equipment to be cleaned using cleaners approved by and as recommended by the manufacturers to a condition of sanitation ready and acceptable for intended food service use. Equipment is cleaned just prior to Owner's acceptance.

- B. Work denoted as "Furnished By Others" (F.B.O.) or "By Other Trades" in Part 3, Equipment Schedule, in this Section will be furnished and installed under other Sections.
- C. Any reference to "standard" in Part 3, Equipment Schedule, in this Section is to be supplied whether or not it is identified as standard by the manufacturer.
- D. GENERAL COORDINATION NOTE:

Utility sizes, connections and locations are based on the Food Service Drawings and Specified Equipment in Section 11 40 00. Alternates are listed BUT it is the responsibility of the Food Service Contractor to compare utilities between manufacturer specified, prime specification, and alternates listed. If alternate equipment is submitted for approval to the Architect by the awarded bidder and is different than prime specifications and has different utilities; it is the General Contractor and Food Service Contractor responsibility for these changes and/or costs. There will not be ANY change orders approved after the bid for substitutions and/or cost associated with substitutions. This is a non-negotiable statement.

### 1.3 PERMITS AND LICENSES

- A. Pay all costs for permits, licenses, and fees, which are required for the work associated with this Section, and which may arise incidental to fulfilling of these specifications.

### 1.4 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Upon demand, provide evidence satisfactory to the Architect and Owner of having successfully completed Food Service Equipment projects of a size comparable to this one, and having sufficient experience in the work called for to assure completion of this project in a satisfactory manner. If requested, submit as a minimum the following information to the Architect within five days of receipt of request: Number of years in Food Service Equipment Industry; Key organizational personnel; Credit rating for this contract; Total amount of work under other contracts this date; Certificate of Licensing from State Licensing Board of General Contractors; past experience in the work called for to assure completion of the work in a satisfactory manner including names of projects, project contract amounts, scope of projects, names, addresses and telephone numbers of references of projects. If requested, submit evidence of sufficient financial resources for completion of this project.
  - 2. The following Food Service Contractors are pre-approved for this project.

Mobile Fixture 865-693-3677 / Nate Duff cell 865-924-2274

nathan.duff@mobilefixture.com

H & R Restaurant Supply 888.364.4080/ David Markowski direct 205-762-8891

dmarkowski@hnrssupply.com

Dykes Restaurant 256-799-7029 / Billy Lynch cell 256-658-9609

blynch@dykesfoodservice.com

B. Custom Equipment Fabricators:

1. It is required that all fabricated equipment such as food serving units, tables, sinks, counter tops, etc., described in the following specifications, other than by name and catalog numbers, be manufactured by an equipment fabricator who has the plant, personnel, and engineering facilities to properly design, detail and manufacture high quality food service equipment. All work in the above category shall be completed by one manufacturer with standard unit assembly and uniform design and finish.

1.5 SUBMITTALS

A. Submittal booklets, electronic, shall contain the following information:

Within 30 days after notice to proceed, and prior to equipment purchase, submit one (1) bound set and PDF copies on THUMB DRIVE of manufacturer's specification and data sheets, describing articles and equipment, as specified, for approval. Illustrations need not be manufacturer's original literature sheets. Each submittal must include manufacturer's literature for each item and a type written specification sheet showing item number, quality to be furnished, manufacturer's name, model number and list optional finishes and accessories to be supplied. In addition, show plumbing and electrical characteristics and/or BTU rating and indicate if electrical cord and plug will be furnished. Material shall be assembled in order by item number as specified herein and brochure shall be complete and include all items. After approval, FSEC to provide six (6) bound sets to General Contractor for distribution to Owner, Architect and Engineers.

B. Shop Drawings, electronic, are required for the following:

1. All custom fabricated equipment including walk-in cooler/freezer, stainless steel fabrication and serving line units, dimensioned and drawn at a minimum scale of 3/4" to the foot, with necessary cross sections at a minimum scale of 1 1/2" to the foot, showing complete detail for each item of specially fabricated equipment. Indicate name of manufacturer.
2. Separate mechanical and electrical rough-in drawings with dimensions showing rough-in locations and final connections for each piece of equipment with each connection shown giving size, height and an explanation with each connection cross-referenced to the specification sheets or shop drawings. Rough-in shall be drawn at a minimum scale of 1/4" to the foot. Above finished floor dimensions are required. All electrical connections are to be water tight or located at a height to prevent water from entering. Coordinate height of rough-ins so as not to interfere with the sealing of tables, overselves and sinks to the walls, etc., as well as at heights for the convenience of the operator. Verify heights required and coordinate with the other trades as required..
3. Service connections located under the exhaust hood must be located to provide the capture space as shown on the enlarged kitchen plan. Space between the backs of the equipment or between the backs of the equipment and wall must be maintained as shown when locating the service connection under the hood. For serving line units, location of floor drains and electrical outlets must be coordinated with the location of drains and cord and plugs on the units.
4. All convenience outlets and convenience drains are to be included on the electrical and mechanical rough-in dimensioned drawings.
5. Dedicated electrical service for computer is required in the manager's office. See electrical, mechanical and plumbing drawings for numbers and locations.

6. Exposed conduit, surface mounted disconnects, surface mounted panel boxes and surface mounted equipment control panels are not permitted unless indicated otherwise or with the permission of the Architect.
7. Provide dimensioned details, sections or elevations for all wall openings for equipment such as pass-thrus, dish machine, chutes, etc.; for all wall or floor recesses for equipment such as walk-in cooler/freezer, floor troughs, wash down system junction boxes and remote stations, waste system control panels, etc. All cross sections, elevations and details are to be drawn at a minimum scale of 1½" to the foot.
8. Provide a dimensioned food service equipment layout separate from the dimensioned electrical and mechanical rough-in drawings showing the placement of all equipment, including the ventilation hood. An itemized equipment schedule is to be included.
9. Provide an electrical and mechanical schedule identified by Item number and description showing the exact electrical and mechanical characteristics required for each item, including comments concerning final connections and interconnections. Power/fuel requirements, water/drainage requirements and similar information are to be included.
10. All drawings are to be based upon the food service equipment layout and itemized specifications. Drawings will include accurately dimensioned layouts and locations for all masonry bases, if required or called for, and will include accurately dimensioned details and locations of any special wall openings that are required for equipment extending through walls.
11. All rough-in connections located in walls are to be dimensioned to avoid any cove tile, stainless steel bases, shelves, table, counter tops, and backsplashes.

- C. Submittal requirements are as specified in Division 1 Section "Submittal Procedures"

#### 1.6 MATERIAL AND WORKMANSHIP

- A. Unless otherwise specified or shown on drawings, all material is to be new, of best quality, perfect and without flaws, and delivered upon completion in an undamaged condition.
- B. All workmanship is required to be the best of its respective kind. All labor to be performed in a thorough workmanlike manner by qualified, efficient and skilled mechanics.
- C. Equipment will be inspected after delivery and any equipment found not to be in accordance with specifications, drawings and/or approved shop drawings will be rejected and shall be replaced with the approved equipment, with associated cost borne by the Contractor. Any defects found during inspection must be remedied to the satisfaction of the Owner and Architect.

#### 1.7 STANDARDS

- A. All equipment shall be constructed in strict compliance with the standards of the National Sanitation Foundation (NSF) and in full compliance with the Public Health Regulations of the State in which installation is made. Each piece of equipment must bear "Seal of Approval" label of the National Sanitation Foundation, if applicable.
- B. Dish machines must conform to the latest adopted standards, and electrical and gas cooking and warming equipment must conform to the latest adopted standards, as established by the National Sanitation Foundation, Ann Arbor, Michigan.

- C. ANSI Standards: Comply with applicable ANSI standards for electric powered and gas burning appliances, for piping to compressed gas cylinders, and for plumbing fittings including vacuum breakers and air gaps to prevent back siphonage in water piping.
- D. NFPA Codes: Comply with the latest adopted NFPA Codes, "National Electrical Code", "Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment", and "National Fuel Gas Code".
- E. ASME Boiler Code: Construct steam generating and closed steam heated equipment to comply with the latest adopted ASME Boiler and Pressure Vessel Codes.
- F. All electrical equipment is U.L. Approved and Listed.
- G. All gas equipment is AGA Approved and Listed.

#### 1.8 COMPLIANCE WITH LAWS AND CODE REGULATIONS

- A. Nothing in the Contract Documents shall be construed to conflict with any local, state or federal laws or regulations governing the installation or any part of the work to be performed under this Contract, and all requirements shall be in accordance therewith, without any additional cost to the Owner.

#### 1.9 INSPECTION OF WORK

- A. The Owner, Architect, or their duly authorized representative shall have free access to the work covered by these specifications for the purpose of observation, in the shop, in storage and at the job site, of the work for conformance with the Contract Documents. Nonconforming work and/or equipment shall be corrected when

#### 1.10 WAREHOUSING

- A. Because of the possibility of damage to the kitchen equipment, it is not shipped directly to the job site. It is shipped to the Food Service Equipment Contractor's warehouse and delivered and removed from crates by him. The one exception to this is the fabricated equipment which may be shipped at a time when the building is ready to receive it and which may be delivered direct to the job site. The delivery time is coordinated with the General Contractor to arrive at a time when it will not interfere with the operation of other contractors, but in time for the various tradesmen to make their final connections.
- B. Stored materials must be stored in an insured warehouse by the Food Service Equipment Contractor. The Food Service Equipment Contractor is totally responsible for stored equipment.
- C. Receipt, unloading, removal from crates, etc., is the sole responsibility of the Food Service Equipment Contractor.

#### 1.11 ROYALTIES AND PATENTS

Food Service Equipment Contractor pays all fees and royalties for patented articles used under this specification.

1.12 WORK BY OTHER TRADES

- B. The work to be provided under other Sections includes roughing-in to points indicated on the mechanical, plumbing and electrical plans, final connections from rough-in point to various pieces of Food Service Equipment requiring such connections, final connection between various pieces of equipment or within pieces of equipment as required, and the supplying of all necessary materials, tools and labor for this work.
- C. Electrical Work performed under Division 26 includes the following:
  - 1. Interior wiring and/or control wiring in walk-in cooling equipment, wiring for lights in walk-in cooler/freezer units, sink heaters and ice cream makers.
  - 2. Electrical connections to compressors, blower coils, controls, lights, etc.
  - 3. Install all conduit and wiring for rough-in, final and inter-connections and makes all final connections within, between, and to Food Service Equipment.
  - 4. Wiring for lights in walk-in refrigeration equipment shall be run through conduit installed on the ceiling inside the boxes and not on the top of the boxes. See Installation Instructions, this Section for description of fasteners and use of mastic.
  - 5. Provide any sleeves required for power, controls or alarms.
  - 6. Furnish and install all disconnect switches, safety cut-outs, control panels, fuse boxes, or other electrical controls, fittings, and connections.
  - 7. Install motor starters and switches, which are furnished with Food Service Equipment.
  - 8. Install all cord and plugs, which are furnished loose with Food Service Equipment.
  - 9. Coordinate the installation of electrical components for Food Service Equipment so as to be in compliance with related local codes and regulations.
  - 10. Note that all electrical work related to this Section shall be in compliance with the requirements for WET LOCATION unless otherwise noted.
- D. Plumbing/Piping Work performed under Division 22 includes the following:
  - 1. Provide rough-in and make all final connections including all materials and labor for gas, water and waste within, between and to the Food Service Equipment.
  - 2. Install all faucets, lever waste drains, hose reels with mixing valves and gas pressure regulators, which are furnished with Food Service Equipment.
  - 3. Plumbing connections to compressors, blower coils.
  - 4. Provide any sleeves required for installation of refrigeration tubing or other piping.
  - 5. Piping extensions from fixtures to floor drains and floor sinks for walk-in refrigeration.
  - 6. Flush all lines free of foreign matter before connecting fixtures.
  - 7. Provides water supply piping, traps, check valves, water pressure reducing valves, vacuum breakers, tail pieces and fittings, waste piping, floor drains, gas pressure regulators, shut-off valves, and all other necessary fittings.
  - 8. Provide back flow prevention devices required by regulatory codes and/or the Public Health Department, and install any back flow prevention devices supplied by the Food Service Equipment
  - 9. Provide half drain covers on floor drains or floor sinks for free flowing drain connections where required to prevent water from splashing on surrounding floor and/or equipment.
- E. Ventilation Work performed under Division 23 includes the following:
  - 1. Furnishes and installs necessary ventilation facilities of sufficient capacity to operate the equipment.
  - 2. Furnishes and installs required vent ducts and transitions, and exhaust hood fans, and connects to equipment.
  - 3. Note the ventilator shown in drawings is approximated size of ventilator capture area only.
- F. General Work performed under Divisions 3 through 9

1. Provide a finished floor that is level unless noted otherwise in the Itemized Specifications or on the enlarged Food Service Equipment drawing. Floors are not pitched to drains because of the extensive use of mobile equipment. Leveling of the floor surface in the serving area, under Pass-Thru Refrigerated and Heated Cabinets, under the hood and in the walk-in Cooler/Freezer recess is critical. Equipment in the serving area are equipped with casters and cannot be leveled except by the floor and will not lock together if the floor is not level.
2. Provides all openings and penetrations in walls, ceilings, roofs, etc., for the food service equipment as required and finishes such openings as specified on the Construction Documents

1.13 ENVIRONMENTAL PROTECTION

- A. It is the intent of these specifications to exclude all substances which are potentially hazardous.
- B. The Food Service Contractor is to be aware of this intent and verify through his suppliers and manufacturers that all materials and products provided for this facility are free of known environmental hazardous substances including formaldehyde and asbestos related materials. No such materials shall be installed, even on a temporary basis in any location of the project.

PART 2 - PRODUCTS

2.1 EQUIPMENT MANUFACTURERS

- A. Manufacturers: The equipment specified in Part 3, Equipment Schedule, shall be construed as a **basis-of-design** product and as such sets forth not only quality, standard/optional features but also equipment connection requirements. Acceptable equipment manufacturers shall be listed on a per equipment item basis. Due to the variations of equipment connection requirements from manufacturer to manufacturer the Food Service Equipment Contractor shall be responsible for the following when providing a listed acceptable equipment manufacturer other than the basis-of-design product.
  1. Food Service Contractor shall make the General Contractor aware of any differences in connection requirements, including but not limited to the following:
    - a. Electrical amperage.
    - b. Waste connections and volume.
    - c. Water (hot and cold) connections and volume.
    - d. Exhaust connections and volume.
  2. The Food Service Contractor shall provide, at no additional cost to the Owner, any equipment characteristic considered as a standard on the basis-of-design product but considered as an optional characteristic on the listed acceptable equipment manufacturer.

2.2 FABRICATED EQUIPMENT

- A. The material used in manufacturing equipment shall be as hereafter specified. Material that is not definitely specified shall be of the best quality used for its specified or intended purposes. All materials shall be new and free from all defects and imperfections. All fabricated equipment in this specification shall be custom built by a fabricator who has a complete factory with suitable equipment, personnel, and engineering facilities to properly design, detail, and manufacture the highest quality of food service equipment. All fabricated equipment shall conform to the current standards of the National Sanitation Foundation (NSF), Ann Arbor, Michigan. All fabricated equipment shall bear the NSF seal applied before delivery to the job site.

- B. Where not defined in Itemized Specifications all General Specifications and Sections take precedent.
- C. Deviations or changes from the General Specifications for Fabricated Equipment are found in Itemized Specifications.
- D. Where units cannot be fully shop fabricated; fabrication shop shall complete fabrication work at project site.
- E. Food Service Equipment Contractor is required to make all field measurements and dimensions and deliver and install all fabricated equipment. Measurements are made wall to wall. Fabricator to allow ¼" for fit.
- F. Electrical Specifications
  - 1. Motors up to and including ½ H.P. are wired to 110, 115, or 120 volts, single phase. Motors over ½ H.P. are wired for 208 or 220 volts, three phase, unless otherwise noted on Architect's plans or in the Itemized Specifications.
  - 2. Heating Elements having a connected load up to and including 1,000 watts are wired for 110 or 220 volts, single phase. Any heating element over 1,000 watts or any combination of heating elements within one fixture totaling more than 1,000 watts is wired for 208 or 220 volts, single phase, unless otherwise noted on Architect's plans or in the Itemized Specifications. All units are wired to a single master switch.
  - 3. Provide 480 volt, three phase power where called for in the Itemized Specifications or as noted on Electrical drawings.
- G. Switches and Controls
  - 1. The Food Service Equipment Contractor supplies for each motor driven appliance or electrically heated unit, a suitable control switch or starter of proper type in accordance with Underwriter's Code. Controls that are mounted on vertical surfaces of fabricated fixtures are set into recessed die stamped stainless steel cups or otherwise indented to prevent damage.
  - 2. All internal wiring for fabricated equipment items, including all electrical devices, wiring controls, switches, etc., built into or forming an integral part of these items are furnished and installed by Food Service Equipment Fabricator in his factory with all items wired completely to a junction box within the fixture ready for final connection to building lines. All receptacles are grounding type listed by Underwriters Laboratories and approved by National Electrical Code. A standard three-prong plug to fit "U" slot grounding type receptacles is provided for all equipment operating off a 110 or 120 volt single phase A.C. electrical outlet. A three-wire cord of suitable length is provided for this equipment as well. All cord sets are to contain an equipment grounding conductor and be furnished with caps or plugs listed by Underwriter's Laboratories.
- H. Faucets, Valves, and Fittings
  - 1. Food Service Equipment Contractor furnishes all faucets and lever waste drains. Sinks are fitted with faucets as called for under each item or as separate item listed as faucets. All special faucets for kettles, pre-wash, etc., are listed under Itemized Specifications.
  - 2. Faucets are properly tagged with item numbers and delivered to Plumbing Contractor on job for installation. Mounting of faucets to fixtures is responsibility of Plumbing Contractor. Lever waste drains are installed into bottom of sinks by Food Service Equipment Contractor.
  - 3. Faucets and hose and spray units with a mixing valve shall be provided with internal spring checks to prevent cross flow of water. If mixing faucet is attached to hose and spray unit with back flow prevention device, the faucet may have to be modified with a spring check

spindle and/or check valves provided to prevent cross flow of water. Back flow prevention devices must be compatible with base unit and meet Public Health Code. It is the responsibility of the Food Service Equipment Contractor to verify the Public Health requirements and supply back flow prevention devices accordingly.

4. All other fittings, such as stops, shut-offs, trap valves, etc., furnished and installed by Plumbing Contractor.
5. Openings for faucets and spray units are located by the Fabricator to prevent handles from hitting splash when in the fully open position.

I. Non-Corrodible Alloy

1. Non-Corrodible alloy, or stainless steel, specified hereafter are Type 304 stainless steel, having a standard analysis of 18% chrome and 8% nickel and .08% carbon steel.
2. All gauges, where specified, are United States Standard gauges. All exposed surfaces are given a #4 finish 180 grit. Where manufacturing process and welding disturb the original finish, it is carefully reground, polished and restored to match balance of surface. All gauges, not specified, are United States Type 304, 18-8, 14 gauge stainless steel.

J. Galvanized

1. Where galvanized iron is specified, tight coat galvanized Copper Bearing is furnished in largest possible sheets with as few joints as necessary. The sheets are of an approved grade, re-rolled for smoothness.
2. Paint with hammertone grey enamel which meets U.S.D.A. criteria unless specified otherwise. Underbracing is not painted with hammertone grey enamel.

K. Welding

1. All welding of stainless steel, whether specified or implied, is accomplished by the heli-arc method using stainless steel rod of the same composition as the parts welded. Welds are ground smooth and polished to the original finish of the metal, with the grain uniform to the grain of the original sheet. The stainless steel welds are free of pits, flaws, discolorations, and peened to remove flux and impurities. Where the grinding and polishing have destroyed the grain, restore and blend to obliterate all traces of welding. Welds are ground back to the surface of the original metal and sealed. Acetylene welding will not be accepted. Solder will not be accepted. Shop seams and corners in stainless steel tops shall be welded, ground smooth and polished.
2. All welds of galvanized metal on dish tables and sinks shall be ground smooth and sandblasted and sprayed with molten zinc at 1200 Fahrenheit to a .004 thickness. Tinning of welds is not acceptable.

L. Pipe Stands and Frames

1. All pipe stands for work tables, open base tables, dish tables, sinks and drainboards are constructed of 1-5/8" O.D. stainless steel tubing (16 gauge, type 304) or as indicated in the Itemized Specifications. All stringers and cross bracing are of same material as legs. All joints between legs and cross braces are notched, welded and ground smoothly. Legs fitted at top with fully enclosed stainless steel gussets welded to angle underbracing and stud bolted to top. Legs are attached without the use of bolts and are spaced on maximum of 4' to 5' centers.
2. Crossrails are supplied between each leg. Legs anchored to closed gussets at top only and without crossrails are not acceptable. Constructed of 1-5/8" O.D. stainless steel tubing (16 gauge, type 304).
3. All crossrails are 12" O. A. above floor, or as called for by local health authorities. Verify that height of crossrails does not interfere with service connections.

M. Bracing

1. Bracing is 12 gauge 1" X 4" X 1" galvanized iron channels and 12 gauge 1½" X 1½" X 1/8" galvanized iron angles. See Table Top section for attachment. Amount of bracing provided is as required to reinforce to prevent noticeable deflection. Tops of work tables, dish tables, enclosed base tables, serving counters and drainboards are braced. Clear silicon caulking manufactured to with stand 400° F. temperature water is applied at seam between bracing and tops.
  2. Exposed underbracing is 14 gauge, type 304 stainless steel.
- N. Sound Deadening
1. Furnish sound deadening pads to break metal to metal contact between bracing and tops on all work tables, dish tables, sinks, drainboards, enclosed base tables and serving counters except where noted otherwise.
  2. Furnish sound deadening pads on underside of all sinks including pre-wash and disposal sinks, dish tables, drainboards, and underside of all tables between bracing.
  3. Double walled sliding and swing doors are fitted with sound deadening insulation between the walls.
- O. Feet
1. All pipe legs are fitted with sanitary die stamped stainless steel bullet shaped feet, fully enclosed with a slightly rounded bottom to protect the floor. Top of these feet are fitted with a male threaded stem to fit into the end of pipe legs hereinabove specified and provide a total adjustment of 1". Stem is extra long so threads are not exposed. Bottom of pipe leg is finished off smoothly and overlap stem to provide sanitary fitting and prevent accumulation of grease or other debris at this joint.
  2. Cabinet type fixtures are mounted on 6" high die stamped sanitary one piece stainless steel legs and adjustable feet not less than 3" in diameter at top. Bottom adjusting member to telescope up into inside of upper member and match adjuster on open base units. Legs are fitted with a male threaded stem and have an adjustment of 1" on the 6" high legs. The upper part is stamped in a neat design with flared inverted shoulder, welded to stainless steel base plate designed for anchoring to channel braces below cabinet type fixtures.
- P. Table Tops (Metal)
1. Metal table tops are made of 14 gauge stainless steel. See Itemized Specifications for description of edge. Shop seams and corners are welded, ground smooth and polished. Working tops are reinforced on the underside with a framework of 12 gauge 1" x 4" x 1" galvanized iron channel and 1½" x 1½" x 1/8" galvanized iron angles as required. All horizontal and vertical cove corners on a ¼" or larger radius. Height of table top is 34".
  2. Tops are reinforced so there will be no noticeable deflections, with reinforcements stud welded to underside of top. Rivets or bolts used through the top are not accepted. Reinforced with 12 gauge 1" x 4" x 1" galvanized iron channel and 1½" x 1½" x 1/8" galvanized iron angles. Bracing is stud bolted to underside of top with cadmium plated lock nuts. Sound deadening pads are applied to break metal to metal contact between all bracing and underside of top.
  3. Field joints are provided in tops where necessary, located for practical construction and consistent with sizes convenient for shipping and accessibility into buildings. See section entitled "Field Joints" for description of these joints.
  4. See Itemized Specifications for description of edge.
- Q. Dish Table Tops
1. Tops of dish tables are constructed of 14 gauge stainless steel with all free edges turned up 3" and finished with 1½" diameter sanitary rolled rim. Sides and back adjacent to walls or higher fixtures are coved up 8", returned 2½" on a 45° angle, turned straight back 3/4" and straight down ½" along wall edges to an overall height of 10". Table is attached to wall

with 12" stainless steel strips (Z clips). All interior horizontal and vertical corners are covered on a 1/4" or larger radius. Outside radius of rolled rim corners is concentric with inside cove. Top is reinforced, braced and sound deadened the same as Table Top.

2. Dish Table Tops are mounted on tubular stainless steel legs and adjustable feet with connecting rails the same as specified for pipe stands and frames.
3. Ends of splash are closed. Free corners of tops are spherical.
4. Legs are fitted with adjustable stainless steel bullet feet as described under feet.
5. Field joints are provided in tops where necessary, located for practical construction and consistent with sizes convenient for shipping and accessibility into buildings. See section entitled "Field Joints" for description.

R. Drawers

1. Drawer housing is fully enclosed and is made entirely from 18 gauge 304 stainless steel including any reinforcements, 24" X 24" X 8", or as called for in Itemized Specifications.
2. Internal drawer slide assembly is removable. Drawer slide assembly is stainless steel full extension drawer slides with stainless steel bearing wheels and screws: Standard-Keil 1452 series or Component Hardware Group Inc. S52 series.
3. Drawer face is of 14 gauge stainless steel. Face equipped with an integral handle across the entire top of the drawer.
4. Drawer pan is die drawn with fully covered corners from one piece of 18 gauge 304 stainless steel, 20" X 20" X 5" deep or as called for in the Itemized Specifications. Top edges to flange out 1 1/2". Interior horizontal corners of the pan are rounded on a 1" radius and interior vertical corners of the pan on a 2" radius. The use of solder or other material to fill in these corners is not acceptable.
5. Apply 1/8" mastic sealant between drawer flange and work surface.
6. Tier of drawers is constructed in same manner as single drawer.
7. Drawers over 5" deep provided with drain hole and cap in front.
8. Each drawer mounted on a mobile unit contains (2) concealed magnetic latches with a minimum release tension of twenty pounds located at rear of drawer.
9. Single drawer and top drawer in tier of drawers are fabricated with a trough protector (gutter) to prevent entry of moisture.

S. Undershelves

1. The undershelves on open base tables are solid removable type of 16 gauge stainless steel.
2. Shelf is made in removable sections with rolled down edges on sides which overlap pipe crossrails where they abut same.
3. Abutting sections of shelves are turned down 1" straight.
4. Shelves are notched to legs of table.
5. Size of shelf is fabricated in sections for easy handling and for sending through dish machine.

T. Elevated Shelves

1. Elevated shelves constructed of 14 gauge stainless steel.
2. Shelf is mounted on 16 gauge 1-5/8" O.D. stainless steel tubular supports. Shelf is 12" wide unless stated otherwise; height is 18" and shelf is supported by cantilever supports mounted through the splash and into gusset welded to table bracing. Gusset fitted with set screw.
3. Three supports are required for shelves four to eight feet in length. One additional support is required for each additional three feet over eight feet in length as a minimum.
4. Front and sides have a marine edge. Back side is turned up 90° 2", returned 1/2" on a 45° angle, turned straight back 5/8", straight down 5/8" and hemmed. Shelf backsplash is capped at both ends. When elevated shelf is attached to a wall, 12" stainless steel "Z" clips

and clear silicon caulking that will withstand 190° F. temperature water are used in order for shelf to be attached to wall. Elevated shelf on mobile units is never attached to wall regardless of location.

5. A minimum of ½" of insulation is required to separate heat lamps and shelf when lamp is installed underneath shelf.

U. Sinks

1. Sinks are of the size called for, constructed of 14 gauge stainless steel, type 304 (18-8), #4 finish. Backs, bottoms and fronts shall be formed of one continuous sheet with ends welded in place. Compartment sinks have double wall partitions of same material as sink.
2. Vertical and horizontal corners, including partition, are coved ½" or larger radius, electrically welded, ground smooth and polished.
3. Top edges of sinks at front and ends, except where fitted with integral type drainboards, are furnished with a 1½" die formed integral sanitary roll rim.
4. Across back of sinks, unless otherwise specified, there will be a 10" high backsplash at walls. When sink adjoins side walls, unless otherwise specified, there will be a 10" high sidesplash. Back and sides, where applicable, are coved up 8", returned 2½" on a 45° angle, turned straight back ¾" and straight down ½" along wall edges to an overall height of 10". Sink attached to wall with 12" stainless steel strip (Z clips). Faucet holes are provided in backsplash 4" down from top. Faucet holes are centered over single compartment sinks and centered over partitions on multi-compartment sinks. Where roll terminates into backsplash the roll is fully welded and polished thereto. Ends of splash are fully enclosed, integrally welded, finished and polished and fully sealed by welding to meet NSF requirements unless specified otherwise. Sinks not adjacent to wall are equipped with backsplash that is fully enclosed, integrally welded, finished and polished and fully sealed by welding. Access openings are provided by the fabricator in the top and bottom of the enclosed backsplash for piping for faucets and vacuum breakers. Rubber grommets are supplied to seal between the piping and the edge of the openings to prevent corrosion between dissimilar metals.
5. Sinks are 37" high to top of roll, 34" AFF to deck and 14" deep from top of roll to bottom of compartment unless specified otherwise.
6. Bottom of each compartment is die-stamped with tapered grooves at least ¼" deep at drain depression. Each compartment is provided with 2" lever type drain. Drain is fitted with rod lever for opening and closing drain. Each rod handle is suitably braced to bottom of sink with 16 gauge stainless steel bracket. All other components are nickel plated to match stainless steel. Drain is equipped with solid stainless steel handle assembly. Strainers are flat type made of stainless steel and snap-in. Drains have positive sealing action with heavy wall cast bronze body and self-centering face flanges.
7. Bodies are mounted on 1-5/8" O.D. tubing legs of 16 gauge stainlesssteel and fitted with stainless steel bullet type adjustable feet. Legs are mounted with 16 gauge stainless steel fully enclosed gussets fully welded to the sink bottom. See Pipe Stands and Frames and Feet sections.
8. Crossrails are 1-5/8" O.D. stainless steel tubing located 12" from floor; running front to back on legs forming a "H" frame unless specified otherwise. See Pipe Stands and Frames section. Locate crossrails to the front of the sink compartments. Coordinate height of crossrails and location of legs to avoid interference with sink heater controls.
9. All three-compartment sinks with drainboards longer than 27" to have six (6) legs unless specified otherwise. All three-compartment sinks with drainboards 27" or shorter to have four (4) legs mounted underneath sink body at corners. All drainboards longer than 27" require legs. If sink heater is specified for three-compartment sink with drainboards longer than 27", crossrail is located in front of drainboard adjacent to sink heater and rear of drainboard opposite of sink heater. If sink heater is not specified for three-compartment sink with drainboards longer than 27", crossrails are located at rear of drainboards.

10. In compartment with a sink heater, move the sink drain toward the side opposite the heater.
11. All three compartment sinks have 24" X 27" compartments with an overall width of 31¼" unless specified otherwise. Compartment size must accommodate 18" X 26" sheet pans for total immersion.
12. Overall length and width is noted in the Itemized Specifications.
13. Bracing and sound deadening are the same as for table top.
14. Sound deadening pads are furnished on underside of sink compartments and drainboards.
15. Coordinate with Plumbing Contractor for location of faucet and vacuum breaker and provide knock-outs for same.
16. Provide rubber grommets for openings through which plumbing lines are routed to prevent dissimilar metal from touching. Label and deliver to Plumbing Contractor for installation.

V. Sink Inserts

1. Sink inserts are fabricated with no visible seams, size as called for, and constructed of 14 gauge stainless steel.
2. Sinks are welded integral with counter tops with no lap between.
3. Corners, partitions, bottoms and drains, sound deadening, etc., as specified under section entitled "Sinks".

W. Sink Drainboards

1. Drainboards are constructed of same material as sinks and welded integral to same. Drainboards to have 1½" high rims with die formed integral rolled edges to match sink edges. Horizontal and vertical corners are coved on a ¼" or larger radius, electrically welded, ground and polished to a #4 finish. Solder filling of these corners is not acceptable. Drainboards are pitched to properly drain into sink. (Minimum pitch in top of drainboards is 1/8" per foot from end of drainboard to sink compartments).
2. Across backs and ends against walls or high fixtures, drainboards have a 10" high backsplash and sidesplash, when applicable, to match splash of sink compartment. Backsplash and sidesplash, when applicable, are welded integral with splash of sink compartment with ends fully enclosed, integrally welded, finished and polished and fully sealed by welding. Attached to wall with 12" stainless steel "Z" clips. See description for exposed backsplashes and sidesplashes this Section for specifications for drainboards not attached to wall.
3. Sink and drainboards are constructed so that the rolled rims on drainboards are continuous and at the same height of 34". Where drainboards are longer than 27" in length, they are supported on pipe legs of same material as used for sink legs and cross braced above the floor with pipe rail. See Pipe Stands and Frames section.
4. Drainboard underbracing is 1½" x 1½" x 1/8" 14 gauge, type 304 stainless steel stud bolted to top. Sound deadening pads applied between angles and top and on underside between angles.

X. Edges

1. Marine edge.
2. Bull nose marine edge.
3. Bull nose edge.
4. Inverted rolled rim.
5. Standard table edge.
6. Flat turndown edge.
7. Standard roll rim edge.
8. Rolled table edge.

Y. Back, Sidesplashes

1. Back and sidesplashes cove up per drawings and specifications, return 2½" on a 45° angle, turn straight back ¾" and turn straight down ½". If adjacent to wall and non-mobile, attach to wall with 12" stainless steel strip (Z clips).
2. Sides of sidesplashes and ends of sidesplashes are fully enclosed, integrally welded, finished and polished and fully sealed by welding to the top to meet NSF requirements unless specified otherwise. Use of silicon cannot be used to seal sidesplash on the outside but is one continuous piece. Sidesplash adjacent to wall is coved up 8", returned 2½" on a 45° angle, turned straight back ¾" and turned straight down ½" to an overall height of 10" and attached to wall with 12" stainless steel strip (Z clips). End is fully enclosed, integrally welded, finished and polished and fully sealed by welding to the top.
3. Ends of backsplash are fully enclosed, integrally welded, finished and polished and fully sealed by welding to the top to meet NSF requirements unless specified otherwise.
4. Backsplash and sidesplashes for mobile equipment or equipment not adjacent to wall are fully enclosed, integrally welded, finished and polished and fully sealed by welding to the top and sides to meet NSF requirements unless specified otherwise. Use of silicon cannot be used to seal splashes on the outside but is one continuous piece. Access openings are required in fully enclosed backsplash by the fabricator through the top and bottom of the backsplash for equipment requiring piping for faucet and vacuum breaker. When applicable, removable 16 gauge, Type 304, 18-8 stainless steel enclosure panel (skirt) is supplied and installed at back of equipment below backsplash to cover exposed electrical and plumbing connections. Equipment attached to wall with "Z" clips does not have an enclosed backsplash but backsplash is turned down next to wall ½". End is fully enclosed, integrally welded, finished and polished and fully sealed by welding to the top.
5. All fully enclosed backsplashes and sidesplashes extend down to counter or table top or below in order to cover all underbracing.
6. In instances where backsplashes and sidesplashes are attached to the walls and are not fully enclosed, exposed underbracing is 14 gauge, type 304 stainless steel.

Z. Casters

1. All casters are 5" with brake unless specified otherwise.

AA. Field Joints

1. Field joints are located for practical construction, consistent with sizes convenient for shipping and accessibility into building.
2. Field joints in tops are carefully sheared so they can be tightly butted and joined together to form an integral unit to match balance of equipment.
3. Field joints and butte joints are heli-arc welded, ground and polished smoothly. These joints are made by the approved fabricator.

BB. Refrigeration Service

1. Refrigeration service includes start-up and all parts; service, parts, mileage, transportation and labor warranty for one year from the date of final acceptance by the Owner and a five year non-prorated compressor replacement warranty from the date of final acceptance by the Owner.

CC. Painting

1. All fixtures, unless made of stainless steel, are finished with hammertone grey paint of the highest quality, air-dried and applied in accordance with the manufacturer's direction.

DD. Joints, Finishes and Trim Strips

1. All equipment is formed of one piece of material wherever possible, with due regard to shipping and erection.

2. All joints, where necessary, are homogeneously welded by electric fusion metal arc, using welding rod of same composition as material being welded, ground smooth and polished to an invisible joint to match adjoining surfaces.

EE. Definition

1. "Fully" is defined as continuously. Stainless steel gussets are fully (continuously) welded.

FF. Sealing

1. Any gaps or crevices such as the seam between under bracing and top are fully (continuously) sealed with sealant as described in this Section.
2. Supply and install rubber grommets for all openings through which dissimilar metals pass such as piping for disposal vacuum breaker in soiled dish table.

GG. Coordination

1. Provide copy of specification sheet or shop drawing for integral equipment such as dish machine, waste system, disposal, booster heater, etc. to fabricator for use in preparing submittal drawings.

HH. Approved Fabricators

1. Fabricators which are pre-approved for construction of stainless steel custom fabrication (serving line equipment excluded) are:  
Titan Stainless, Pageland, SC  
Low Temp Industries  
Advance Tabco

## 2.3 GENERAL MANUFACTURING NOTES FOR ALL EQUIPMENT

- A. Water inlets are located above positive water level to prevent syphoning of liquids into the water system. Wherever conditions require a water inlet placed below the water level, Food Service Equipment Contractor supplies suitable type of vacuum breaker or back flow prevention device for the fixture to form part of same to prevent siphoning; labels and delivers to Plumbing Contractor for installation. Food Service Equipment supplier is required to furnish back flow prevention device as required by the Public Health Department for any piece of equipment supplied. It is noted that Public Health Departments usually require back flow prevention device on water inlet for Convection Combo type units. All back flow prevention devices must be acceptable to the Public Health Department.
- B. Food Service Equipment Contractor supplies all faucets, spray and hose units with mixing valves and cross flow prevention devices if supply through unit is hot and cold water and all hose and spray units with back flow prevention devices. Face for all spray units is stainless steel. See description of Faucets, Valves and Fittings this section. Parts are labeled and delivered to Plumbing Contractor for installation.
- C. Suitable pipe slots are provided through all undershelves to accommodate necessary service lines. These slots are proper size and are neatly made with turned up edges on all four sides to eliminate cutting or defacing of equipment on job. Cabinet bases are provided with an inner panel duct at ends or rear of cabinet to allow enclosed vertical and horizontal pipe space to conceal the vertical and horizontal piping.
- D. All hardware, including that used for refrigerators, is heavy-duty cast type and arranged for locking device. Mounting screws are stainless steel or non-corrosive. Hardware is specifically selected

for the particular use to which each piece is intended. Mastic required between non-similar metals to prevent rusting.

### PART 3 - EXECUTION

#### 3.1 EQUIPMENT DELIVERY

- A. Equipment is not to be delivered, removed from crates, set-in-place for final connections until as a minimum all painting has been completed; ceilings, hood and ventilation duct work are in place; floor is cleaned; and all rough-in connections are in place. Site must be ready for final connections

#### 3.2 INSTALLATION

- A. Where there are gaps or spaces over 1/8" between walls and equipment, at tops of backsplashes, between adjoining pieces of equipment, etc., necessary trim strips are furnished for the proper finishing in installation. Necessary measurements for trim strips are taken during the time of installation in order to afford proper fit. Wall trim is made generally from 22 gauge Type 304, 18-8 stainless steel, broke to provide a tight fit. Trim is attached to backsplash (metal) with adhesive. Exposed fasteners may not be used to attach trim to metal backsplashes. In all other instances stainless steel fasteners may be used to attach trim to walls and equipment if equipment finish is stainless steel. Non-corrosive fasteners are required if equipment finish is not stainless steel. Fasteners supplied and installed by other contractors to attach conduit and other materials to the Food Service Equipment must meet the preceding specifications. Trim is sealed to wall and equipment with clear silicon caulking; see installation requirements this Section.
- B. Install closure plates and strips where required, of same material as equipment with joints coordinated with units of equipment. Joints are sealed with clear silicon caulking; see description of caulking types, this Section.
- C. Install insulation where indicated by industry standards and sealants and gaskets all around each unit and penetration or as required to make joints air-tight, waterproof, vermin-proof and sanitary for cleaning purposes. In general, clear silicon caulking is the sealant. In general, make sealed joints not less than 1/8" wide and stuff with backer rod to shape sealant bead properly, at 1/4" depth. Shape exposed surfaces of sealant slightly concave, with edges flush with faces of material at joint. Anchor gaskets mechanically or with adhesives to prevent displacement.
- D. Conduit seal-offs required for penetrations into walk-in cooler/freezer.
- E. Mastic is required between fasteners and equipment or trim and equipment when non-similar metals are used to prevent rusting through electrolysis. Rubber grommets are required where plumbing lines and connections penetrate splashes to prevent corrosion. Food Service Equipment Contractor supplies, labels and delivers rubber grommets to Plumbing Contractor for installation.
- F. All single or multiple compartment sinks and tables with single or multiple compartment sinks are attached to the wall with 12" stainless steel strips (Z clips) and sealed with clear silicon caulking if located adjacent to wall.
- G. Top shelf on all shelving and shelving/platform units unless noted otherwise is installed even with the top of the posts.

- H. Air curtain devices shall be adjusted to regulate the velocity and volume of air at the air outlet for the purpose intended.
- I. One hundred percent clear silicon caulking approved for use with food and rated to withstand temperatures up to 400° F. is used when caulking comes in contact with 190° F. water. General Electric sealant SCS 1000 and SCS 1200 and Component Hardware Silicone Sealer are the standards.
- J. Caulking required with glass, copper, mill finish aluminum, galvanized steel, many plastics, stone, concrete and masonry finishes and rated to withstand temperatures up to 400° F. is General Electric sealants, Silglaze N or Gesil N depending upon the cure time required and the color specified. These sealants are only used with non-food contact surfaces. Examples: Floor level, trim at dish room openings and pass-thru openings.
- K. Light fixtures over the door frames of walk-in refrigeration boxes are installed at a height sufficient to accommodate installation of strip curtains, if specified.
- L. All thermometers, timers, thermostats for all equipment is tested and calibrated to proper operating conditions.
- M. The equipment under the hood is positioned to allow for proper capture. Refer to drawings. Food Service Equipment Contractor is responsible for coordinating with all other contractors the proper locations of service connections under the hood to maintain floor space for equipment and the space in front of and behind or between the equipment under the hood as shown on the Food Service Equipment (Kitchen) Plan.
- N. Food Service Equipment Contractor is responsible for coordinating the placement of the hood to maintain working aisle spaces.
- O. If sprinkler heads are installed inside walk-in cooler/freezer box, Food Service Equipment Contractor is responsible for insulating and sealing penetrations properly to prevent condensation and ice formation.

### 3.3 QUALITY AND GUARANTEE

- A. All equipment is guaranteed by the Food Service Equipment Contractor to be free from defects in workmanship and/or material for a period of one (1) year from the date of substantial completion of same by the Architect and Owner. This guarantee covers replacement of defective material at Food Service Equipment Contractor's expense, including parts, mileage, service, transportation and labor, but it does not cover any cost whatsoever for replacement of parts or work made necessary by carelessness or misuse of equipment. All Refrigeration units have a five (5) year non-prorated replacement warranty on the compressor from the date of substantial completion of same by the Architect and Owner. Extended warranties are specified in the Itemized Equipment Specifications, this Section.

### 3.4 TESTING AND START-UP INSTRUCTIONS

- A. After all utility connections to equipment have been made by other contractors, Food Service Equipment Contractor starts-up, adjusts, levels and calibrates all equipment. Calibrate all thermometers, timers, and thermostats. After start-up and adjustment Food Service Equipment

Contractor conducts final test of equipment before requesting first inspection by Architect and his Food Service Equipment Consultant.

- B. Delay start-ups of food service equipment until service lines have been tested, balanced, and adjusted for pressure, voltage and similar considerations, and until water and steam lines have been cleaned and treated for sanitation by other Contractors.
- C. Test each item of operational equipment to demonstrate that it is operating properly, and that controls and safety devices are functioning. Repair or replace equipment which is found defective in its operation, including units which are below capacity or operating with excessive noise or vibration.
- D. Walk-in Cooler/Freezer refrigeration systems to be run **five consecutive** days prior to equipment demonstrations.
- E. Provide a training program by a Serve Safe certified culinary chef and/or factory representative to consist of one (1) 6 hour day at startup showing all equipment and how it works with demonstrations. Provide training as follow up in another one (1) 4 hour day program within 45 days of start of school. Trainer shall monitor employees and demonstrate how to properly use equipment with live cooking. Service provided shall include abbreviated classes in Serve Safe and HACCP, and the proper method for receiving and storing product. Training to consist of a total of eight (8) hours. Notify GC and Architect of scheduled dates, time and name of Chef with contact info.
- F. Contractor shall issue a letter, signed by all sub-contractors involved and co-signed by Owner's representative stating that CNP staff have been satisfactorily instructed in the use of the equipment.

### 3.5 MANUALS FOR OWNER

- A. Food Service Equipment Contractor, upon completion of work, to deliver to the Architect's Food Service Consultant for review three (3) sets of Operation and Maintenance Manuals. Manuals to include the following information:
  - 1. Warranty statement indicating date of start-up for equipment.
  - 2. Names and addresses of manufacturers supplying the equipment.
  - 3. List of authorized service agencies including name, address and telephone number.
  - 4. Service information organized in a chart format including item description, manufacturer, model, electrical and mechanical characteristics, and serial number.
  - 5. Specification sheets on all items of equipment marked as supplied. Any variations from the original specifications to be noted.
  - 6. Operation and Instruction manuals for each item of equipment including information on the care of finished surfaces.
  - 7. As built shop drawings for all custom equipment.
  - 8. Floor plan, plumbing and electrical rough-in drawings and equipment schedule marked as built. Show any variations from the original drawings.
- B. Organize and assemble all information into three individual hardback vinyl loose-leaf binders properly identified and indexed by manufacturer. Binder to include two pocket folders for folded sheet information. Mark the appropriate identification on both the front and spine of each binder. Binder for site has identification as such on the front and spine.

- C. Organize drawing sheets into manageable sets, bind with durable paper cover sheets and print suitable titles, dates and other identification on cover of each set.
- D. Manuals are assembled and ready to use during demonstration and training.
- E. After review and approval of manuals by the Architect, manuals are transferred to Owner or Owner's representative.

### 3.6 GENERAL OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Food Service Equipment Contractor shall furnish qualified representatives to instruct and demonstrate to the Owner's Personnel, at project site, the proper operation, care and maintenance of all equipment involved including the care of finished surfaces. The dates and times of the demonstration shall be coordinated with the Owner's Personnel. Food items supplied by the Owner are prepared during training by the food service employees utilizing the equipment. Food Service Equipment Contractor identifies to the Owner the food items and supplies required for training at least one week before the scheduled training date. All equipment to be demonstrated must be fully operable before training; all final connections must be made and start-up and adjustment completed.
- B. It is noted that for the purposes of scheduling that all contractors must be completed with their work with-in the kitchen and or serving area prior to equipment demonstration and training.
- C. As part of this instruction, provide a review of the information assembled in the Operation and Maintenance Manuals and the following items which are not inclusive:
  - 1. Maintenance Manuals
  - 2. Operation Manuals
  - 3. Tools
  - 4. Spare parts and materials
  - 5. Lubricants
  - 6. Fuels
  - 7. Identification system
  - 8. Control sequences
  - 9. Hazards
  - 10. Cleaning
- D. For operational equipment also demonstrate:
  - 1. Start-up
  - 2. Shut-down
  - 3. Emergency operations
  - 4. Safety
  - 5. Effective energy utilization
- E. Review maintenance and operations in relation with applicable warranties.
- F. The Food Service Equipment Contractor shall provide a qualified representative to be on site during demonstration and training of all equipment.
- G. Provide one copy of an operation and maintenance video for each piece of equipment, if available. Videos become the property of the Owner.

- H. Submit written documentation, signed by the personnel receiving instruction, that training was received with the date it was given. Submit written documentation that keys were transmitted to Owner.

### 3.7 FINAL CLEANING

- A. General: Provide final cleaning of all equipment both inside and outside. Comply with manufacturers' instructions for cleaning operations. Final cleaning of the food service equipment by the Food Service Equipment Contractor is not scheduled until all contractors other than Food Service Equipment Contractor have completed their work. Food Service Equipment Contractor and General Contractor shall coordinate timing of the final cleaning to allow sufficient time for the Food Service Equipment Contractor to complete his final adjustments; to schedule inspection by the Architect and his Food Service Consultant; and to schedule training of the Food Service employees. The preceding must occur before training is scheduled and Owner occupies the kitchen.
- B. Remove protective coverings and labels which are not required as permanent labels.
- C. Clean glazed materials, including glass shelves and sneeze guards, to a polished condition, removing substances which are noticeable as vision-obscuring materials. Replace any broken glass.
- E. Clean exposed exterior and interior hard-surfaced finishes, including metals, painted surfaces, plastics, special coatings, and similar surfaces, to a dirt-free condition, free of dust, stains, films and similar noticeable distracting substances. Restore reflective surfaces to their original reflective condition.
- F. Replace work which cannot be successfully restored.
- G. Polish exposed metal surfaces and touch-up painted surfaces.
- H. Boil out fryers.
- I. Clean the interior and exterior of all the food service equipment to a condition of sanitation ready and acceptable for intended food service use.
- J. It is the sole responsibility of Food Service Equipment Contractor to protect all food service equipment with coverings, to maintain clean status of equipment between cleaning and occupancy. Protective coverings are removed immediately before Owner occupies the area.
- K. Cleaning is completed by General and Food Service Equipment Contractors before requesting first inspection by Architect and his Food Service Equipment Consultant.

### 3.8 PREREQUISITES TO SUBSTANTIAL COMPLETION

- A. Complete the requirements included in this Section.
- B. Submit Operation and Maintenance Manuals to Architect for review.
- C. Submit Record Document for Architect/General Contractor.

- D. Deliver physical items such as unattached accessories to Owner.
- E. Transmit keys to Owner. Each key is labeled by description and Item Number.
- F. Complete start-up, adjustment, leveling and calibration of all equipment.
- G. Conduct final test of equipment.
- H. Complete final cleaning requirements.
- I. Complete operating and training requirements.
- J. Request first inspection by Architect.
- K. From receipt of written first inspection report prepared by Architect, Food Service Equipment Contractor has ninety days to complete corrections. Notification of receipt is made to Architect by Food Service Equipment Contractor. At the end of the ninety day period, if final inspection by Architect has not been scheduled by the Food Service Equipment Contractor, AIA procedures for correction of the deficiencies by others at the expense of the Food Service Equipment Contractor may be initiated.

### 3.9 PREREQUISITES TO FINAL ACCEPTANCE

- A. Submit to Architect copy of Architect's first and/or prior inspection report of itemized work to be completed or corrected, stating that each item has been corrected or otherwise resolved for acceptance. At same time, request a final inspection by Architect.

### 3.10 RECORD DOCUMENT SUBMITTAL

- A. Record documents shall include the following:
  - 1. Provide one (1) set of as-built shop drawings including floor plan, dimensioned electrical and mechanical rough-in drawings and equipment schedule; as-built shop drawings showing elevations, cross-sections, and details of all custom equipment as provided with the submittals. Give particular attention to concealed work which would be difficult to measure and record at a later date. Note any deviations from the original drawings and specifications. Note related change order numbers where applicable.
- B. Submit directly to Architect and/or General Contractor as required.

### 3.11 EQUIPMENT SCHEDULE

Substitutions by any bidder wishing to supply alternate equipment other than that specified shall follow the requirements listed in the Invitation to Bid.

Bidders recommending such substitutions are cautioned to examine mechanical and electrical plans and conditions of building to determine if such substitutions will require changes in mechanical or electrical connections which have already been planned. If proposed substitutions require such changes, bidder shall be responsible for any cost involved.



ITEM 4: DRY STORAGE ROOM SHELVING QTY: 1-LOT  
HEAVY DUTY  
MANUFACTURER: NEW AGE  
MODEL: SEE BELOW

EACH 3-Tier Stationary Shelving Unit TO CONSIST OF:

3 EACH TB-24XX: "Adjust-A-Shelf" T-Bar Series Shelf, XX"W x 24"D, all welded aluminum construction, 1500 lbs. capacity, NSF, Made in USA  
4 EACH 54P: Post, 54"H, marked in 2" increments, aluminum finish, NSF, Made in USA  
4 EACH 0116: Adjustable Foot, 1-5/16" dia., upright  
Lifetime guarantee against rust & corrosion. Lifetime guarantee against workmanship and material defects.

APPROVED ALTERNATES IF MATCH THE DETAILED SPECIFICATIONS: CHOICE EQUIP.

ITEM 5 FLOOR CLEANING MACHINE QTY 1  
MANUFACTURER: NILFISK  
MODEL: FANG15B

Description:

Viper Fang 15B 15", 3.5 gallon, battery micro scrubber, 15" brush, 20" squeegee assembly, 5-amp Charger, two AGM 33 a/h batteries. [www.nilfisk.com](http://www.nilfisk.com)

ITEM 6 LAUNDRY STORAGE ROOM SHELVING QTY: 1-LOT  
MANUFACTURER: METRO  
MODEL: MetroMax 4®

4-Tier Stationary Shelving Unit

All-polymer corrosion proof shelving with removable open grid or solid shelf mat section. Shelf mats, beams, and posts have built-in Microban® antimicrobial product protection. Rigid four-sided shelf frame and robust corner with complete 360° capture of the wedge and post ensure stability, strength, and structural integrity. Stationary units have maximum capacity of 2,000 lbs. evenly distributed. Mobile units offer a maximum total unit load of 750 lbs. All bottom tier shelves to use solid shelf mats. NSF Listed for all environments.

Each Unit to Consist of Sizes and Quantities as Drawn

4 ea MX74P 74" H Polymer Shelf Posts

3 ea MAX4-\*\*\*\*G Shelf with Grid Mat

1 ea MAX4-\*\*\*\*F Shelf with Solid Mat

Use MetroMax 4® "S" Hook Kits as Drawn

Description:

Four tier shelving units with bottom shelf 8" above finished floor and shelving spaced evenly

ITEM 7 WASHER QTY: 1  
MANUFACTURER: GE  
MODEL: GTW335ASNWW – White

ELECTRICAL: REFERENCE PROJECT DRAWINGS FOR ELECTRICAL REQUIREMENTS.

Description:

Deep Clean Cycle – Achieve the ultimate deep clean for your toughest laundry loads with 67% more cleaning power than the most commonly used cycle\*. \*Colors, Normal cycle  
Capacity – Wash large items and do laundry less often with a large 4.2 cubic feet of capacity.

Water Level/Load Size – Take the guesswork out of choosing the right water level with PreciseFill or manually select any water level for maximum cleaning performance.

Deep Rinse – Ensure clothes are thoroughly rinsed free of detergent, fabric softener and other additives.

Heavy-Duty Agitator – Thoroughly clean every load thanks to a powerful washing motion.  
Stainless Steel Basket – Long-lasting, durable stainless steel resists rust and won't chip, peel or snag clothes.  
Made in America – This appliance is made in America and contains 70 to 90% U.S. content.  
11 Wash Cycles – Choose from 11 wash cycles that accommodate every load type.  
6 Water Temperatures – Pick the water temperature you prefer and wash your way.  
700 RPM Spin Speed – Efficiently remove water and minimize drying time with a fast spin speed.  
Bleach and Fabric Softener Dispensers – Improve results with dispensers that automatically release bleach and fabric softener at the optimal point during the wash cycle.  
Cycle Status Lights – Easily track your wash cycle with lights that indicate fill, soak, wash, rinse or spin status with just a glance.

APPROVED ALTERNATES IF MATCH THE DETAILED SPECIFICATIONS: WHIRLPOOL and SAMSUNG

ITEM 7.1 DRYER QTY: 1

MANUFACTURER: GE

MODEL: GTD33EASKWW – White

ELECTRICAL: REFERENCE PROJECT DRAWINGS FOR ELECTRICAL REQUIREMENTS.

Description:

Aluminized alloy drum – Improves energy efficiency and resists corrosion  
3 heat selections – Offer a choice of drying temperatures for personalized fabric care.  
Up to 120 ft. venting capability – Provides flexible installation  
Auto Dry – For clothes that come out feeling and looking great, this setting monitors air temperature to set the optimal drying time  
Rotary electromechanical controls – Make it simple to set cycles  
Up-front lint filter – Makes cleaning out lint easy  
Reverse-a-door – Door opening can be reversed to meet laundry room needs

APPROVED ALTERNATES IF MATCH THE DETAILED SPECIFICATIONS: WHIRLPOOL and SAMSUNG

ITEM 8 WALL SHELVING QTY: 2

MANUFACTURER: KALTHOFF

MODEL: CUSTOM

Description: Dimensions: 13.5(h) x 60(w) x 15(d)

Shelf, wall-mounted, 60"W x 15"D, 1-5/8" bullnose front edge, 1-1/2"H rear up-turn, 16/304 satin finish stainless steel, NSF

Accessories:

1. Weld support brackets to wall shelf for 15" deep wall shelves

MUST BE OVER THE LENGTH OF THE WASHER AND DRYER-CONFIRM EXACT LENGTH TO FIT.  
MOUNT AT 54" AFF AND 66" AFF.

ITEM 9 MOP SINK WITH UTILITY FAUCET (ITEM 9.1) QTY: NIC (NOT IN CONTRACT)  
BY OTHER TRADES

ITEM 9.1: SERVICE FAUCET QTY: 2

MANUFACTURER: T & S BRASS

MODEL: B-0655-BSTP

Description:

Service Sink Faucet, 8" centers-adjustable from 7-3/4" to 8-1/4", 5-1/8" clearance wall to center line of

faucet, 11-5/8" from wall to center of outlet, polished chrome-plated finish, with built in screwdriver stops

Accessories:

B-0230-K (2 EACH)

Installation Kit, (2) 1/2" NPT nipples, lock nuts & washers, (2) short "Ell" 1/2" NPT female x male

ITEM 10: MOP AND BROOM HANGER

QTY: 2

MANUFACTURER: ADVANCE TABCO

MODEL: K242

Description:

Holds three mops/brooms

Fabricators which are pre-approved for construction of stainless steel custom fabrication (serving line equipment excluded) are: Low Temp Manufacturing, Jonesboro, GA.; Titan Stainless, Pageland, SC and Advance Tabco.

ITEM 11 CARTS (TWO SHOWN ON PLANS)

QTY: 5

MANUFACTURER: RUMBERMAID

1 EACH: MODEL: FG9T6700BLA

Description:

Utility Cart, 40-1/4"L x 25-5/8"W x 27-3/8"H, 500 lb. capacity, (2) shelves, open base, polyethylene exterior, (2) fixed and (2) swivel 4" casters, assembly required, black, Made in USA

1 EACH: MODEL: FG342488BLA

Description:

Utility Cart, 33-5/8"L x 18-5/8"W x 37-3/4"H, 200 lb. capacity, (3) shelves, smooth surface, handles, open sides, plastic construction, brushed aluminum uprights, (4) 4" swivel casters, assembly required, black, HACCP, S.O.S. (Special Order Smallwares) product; see SOS document for details, Made in USA (CANNOT BREAK CASE)

1 EACH: MODEL: FG452500BLA

Description:

Flat Shelf Utility Cart, 43-7/8"L x 25-5/8"W x 33-5/16"H, 500 lb. capacity per shelf, (2) shelves, open base, polyethylene exterior, (4) 5" thermoplastic rubber (TPR) casters, assembly required, black, Made in USA

1 EACH: MODEL: FG440300BLA

Description:

Platform Truck, heavy duty, 36 x 24", 1000 lb. capacity, slide locking latches, molded-in tie-downs slots, textured deck surface, deck channels, retainer clips on handle, powder coated steel handle/frame, (2) fixed and (2) swivel 5" TPR casters, Duramold™ resin and metal composite construction, black, Made in USA

1 EACH: MODEL: FG443600BLA

Description:

Platform Truck, heavy duty, 48" x 24", 2000 lbs. capacity, slide locking latches, molded-in tie-downs slots, textured deck surface, deck channels, retainer clips on handle, powder coated steel handle/frame, (2) fixed and (2) swivel 8" TPR casters, Duramold™ resin and metal composite construction, black, Made in USA

APPROVED ALTERNATES IF MATCH DETAILED SPECIFICATIONS: CARLISLE and CAMBRO

ITEM 12 WALK IN COOLER/FREEZER

QTY: 1-LOT

MANUFACTURER: THERMOKOOL

MODEL: CUSTOM

ELECTRICAL: REFERENCE PROJECT DRAWINGS FOR ELECTRICAL REQUIREMENTS.

Description and Accessories:

Refrigerant:

Cooler: Meet CFC reduction regulations

Freezer: Meet CFC reduction regulations

Size: Nominal 8'-6" high

Verify overall box dimensions with drawings, reference Architectural drawings for wall dimensions.

Door swings and positions must be as shown on the drawing.

All specifications apply to cooler and freezer unless indicated otherwise.

The THERMO-KOOL prefabricated modular construction. It shall be designed and constructed to allow fast and easy field assembly, disassembly, relocation and enlargement by the addition of like modular panels. Walk-in shall be designed and constructed as shown on plan. Overall size of walk-in shall be CUSTOM to fit exact job site requirements. 8'-6" height outside dimensions for walk in is standard unless otherwise noted in the detailed specification per school. See all drawings for special instructions.

PANEL CONSTRUCTION:

Wall and ceiling panel widths shall be within 1" increments up to 46" wide. Corner panels shall be 90 degree angle, 12" x 12". All panels shall be interchangeable with like panels for fast and easy assembly. Partition panel placement shall be within 1" increments to meet shelving space requirements.

All panels shall consist of metal pans formed to precise dimensions. Metal finish to be as specified. Insulation shall be "foamed-in-place" urethane to bond permanently to complete inner surfaces of both interior and exterior metal pans to form strong rigid unit. Panels shall not have internal wood or metal support, framing, straps, or other non-insulating members. Each panel shall be 100% urethane foam insulation exclusive of metal pans. Perimeter structure shall be formed of DURATHANE, high density urethane insulation forming tongues and grooves to assure vapor and airtight joints and to prevent pre-installation damage and deterioration of exposed urethane surfaces.

Construction shall be as approved by the National Sanitation Foundation. Unit shall bear the NSF® Seal of Approval affixed to the interior of a door panel.

Floor is recessed. Coordinate recess depth so that the walk-in box flooring is no more than a ¼" above finished floor of the kitchen. Floor of walk-in cooler/freezer is not covered with kitchen finish floor system.

Common Wall Partition:

When specified or shown on drawing, walk-in shall be divided into compartments by use of insulated panels. Panels shall be constructed in accordance with specifications for all panels. Partitions in standard locations shall be foam tongue and groove construction secured in place by com-lock fasteners. All partition panels shall have foamed-in-place thermal breakers to prevent condensation and heat transfer between compartments of different temperatures.

WARRANTY:

MANUFACTURER MUST PROVIDE ONE YEAR PARTS AND LABOR FOR ALL COMPONENTS OF WALK IN COOLER AND FREEZER.

Panels shall be covered by a Ten-Year Factory Warranty.

Compressor shall have a one year parts and labor warranty with an additional four years for parts for compressor.

INSULATION:

Insulation shall be 4" or 5" thick rigid, zero ozone depleting HFC 134a blown Class I urethane foam classified according to UL 723 (ASTM-E-84) as tested by Underwriters Laboratories, Inc. The core material has a flame spread of 25 or less and a smoke density of 250.

The urethane foam is foamed-in-place to bond to inner surfaces of metal pans having an average thermal conductivity (K factor) of 0.13 BTU/hr./sq. ft. per degrees /Fahrenheit/inch. As tested in accordance with ASTM C 518-2004, the R factor for coolers at temperatures of 55 F° is greater than 29.0 for 4" thick and greater than 36.0 for 5" thick panels; for freezers at temperatures of 20 F° the R factor is greater than 32.0 for 4" thick and greater than 40.0 for 5" thick panels.

(R-value of R-25 for Coolers and R-32 for Freezers required to meet 2009 Energy Code)

The prefabricated urethane foamed panels shall be supplied with a Class I fire hazard classification according to UL 723 (ASTM-E-84) as tested by Underwriters Laboratories, Inc. Panels shall have a flame spread rating of 25 or less and bear a certifying Underwriters Laboratories, Inc. label.

This rating is not intended to reflect hazards presented by this or any other material under actual fire conditions

#### METAL FINISHES:

INTERIOR WALLS are .040 stucco Aluminum.

INTERIOR CEILING is .040 stucco Aluminum with white baked-on enamel finish.

INTERIOR FLOOR is 1/8" Aluminum Diamond Tread Plate.

EXPOSED EXTERIOR WALLS including door section .040 stucco Aluminum.

#### PANEL LOCKING ASSEMBLIES:

Assembly of walk-in shall be accomplished by "Insta-Loks" consisting of cam-action hook arm assembly set in one panel and a self-aligning, self-centering, pin assembly set in the matching panel. All vertical joints must have a minimum of three Insta-loks. Rotation of the cam-action hook arm shall pull and lock panels together to form airtight, vapor proof joints. No metal straps or connecting rods shall be used inside the panels. Rotation of the cam-locks shall be operated from inside the walk-in through access ports that are sealed with vinyl snap-in closures.

#### PANEL GASKETS:

NSF listed double-bead vinyl gasket shall be applied to the tongue side of all panels, on both interior and exterior. Gaskets shall be impervious to stains, grease, oils, mildew, sunlight, etc.

#### ENTRANCE DOOR AND FRAME:

Walk-in compartment shall be equipped with total of two (2) each 34" x 76" hinged-type, flush-mounted entrance door mounted in a nominal 4', 5' or 6' frame and located in exact location as shown on drawing. Door placement shall be within 1" increments to meet shelving space and job site requirements. Door shall be manufactured to accommodate floor construction. Door and frame shall be listed by Underwriters Laboratories and bear the UL Seal of Approval and be equipped with the following:

Door shall be equipped with a one-piece perimeter PVC accordion type removable gasket with magnetic core at the top and along the side perimeter of the door. An adjustable wiper gasket shall be mounted along the bottom edge of the door.

Latch shall be break-a-way type with cylinder lock and inside safety release handle so the door can be opened from the inside even if locked. A positive action hydraulic door closer (required to meet 2009 Energy Code) shall be included to ensure gentle closing action of door to opening and to ensure positive closing of door. The latch shall be of high pressure zinc die cast with highly polished chrome finish.

Two hinges shall be nine inch modified strap, cam-lift, self-closing design with door lift off capability of high-pressure zinc die cast with highly polished chrome finish. (a spring loaded hinge required to meet 2009 Energy Code) KASON model 1346 adjustable hinges are required.

Door frame shall consist of heavy reinforced steel "U" channel frame to encompass entire perimeter of opening, foamed-in-place to give extra support and rigidity to frame and to prevent racking, distortion, warping and twisting. A backup must be welded for added strength.

An armored anti-sweat heater cable shall be run in a breaker strip located behind a removable heavy gauge stainless steel trim for easy access to heater cable. Heater cable shall be run under threshold consisting of heavy reinforcement "U" channel breaker strip and heavy gauge stainless steel threshold. (A second back up heater cable is to be installed).

The warmer cables shall provide sufficient heat to prevent condensate or frost formation. Door heater has a thermostat that cuts off when it reaches a temperature of 50°F.

Door shall be equipped with contemporary design, heavy-duty, pull handle. Pull handle shall have a cylinder lock built into the handle. Latch shall be provided with inside safety release to prevent accidental or malicious entrapment in walk-in. Latch has brushed satin chrome finish. Two (2) keys are provided for lock

Door section shall be provided with an operating toggle switch and pilot light mounted on the exterior side of the door frame. (Weathertight switches also available for outdoor walk-in applications.) An incandescent vapor proof light and face mounted inlet box shall be mounted on the interior side of the door frame for 115 volt, 60 cycle, 1 phase A.C. service (Energy Efficient and Motion Sensor Lighting available for Energy Savings). All wiring shall be in concealed rigid conduit. A 2-1/2" diameter chrome face, flush mount, dual reading, adjustable dial thermometer shall be provided on exterior of door section to provide temperature reading of -40 degrees C to +150 degrees C.

#### AIR DOORS:

Supply air doors (MARS or Berner) with plunger type control in both door panels with adequate backing as required.

#### POWER BOX SUPPLY

Power supply box for all lights, heated vent, air curtain electrical receptacle, air curtain micro-switch, heated window (frame and glass), door heater and sill heater is pre-wired and mounted on top near door section by manufacturer. Electrical Contractor supplies and installs power wiring to power supply box. Wiring for lights; door and sill heaters; heated viewport; heated vent (freezer); air curtain receptacle; and air curtain micro-switch must be identified. Design power supply box such that power can be terminated for service while allowing other accessories to continue to function. Each of the electrical components (heated view port, heated vent, door and sill heaters, lights, air curtain receptacle, air curtain micro-switch) is wired to a 4" x 4" junction box which is foamed in place in the center of the jamb. A short piece of PVC electrical conduit is installed out of the junction box to the top of the foam rail of the jamb for the walk-in. The conduit shall have a coupling on it in order to be mated up with the conduit coming through the ceiling panel

out of the wiring box located on the top of the ceiling. After the walk-in is set-up, the wires are fed from the junction box through the conduit into the power supply box for final termination per the wiring schedule. Walk-in manufacturer pre-wires for incoming power source for air curtain inside front panel with recessed receptacle (115/60/1) foamed in place and located on front of box near top of air curtain. Incoming power connection for air curtain to be located in power supply box on top of each compartment.

#### TREADBRITE KICKPLATES:

Door shall have aluminum diamond treadbrite kickplates 48" high on the interior and exterior. Diamond tread kickplates shall be mounted with adhesive and sealed with silicone. No external fasteners such as screws or pop rivets shall be applied as fastening for the diamond tread kickplates.

#### LED LIGHT FIXTURES:

LED light fixtures shall be provided in quantity as required. (Energy efficient lighting required to meet 2009 Energy Code.) Must have switch with pilot light.

Contractor must furnish CORRECT LED BULBS as required Freezer.

Food Service Equipment Contractor shall install fixtures for Electrical Contractor to wire to junction box provided by manufacturer. LED light fixtures are mounted to ceiling panels where shown on the drawings and are connected to a three-way light switch with dual pilot light. Pilot light glows continuously inside and is on outside of box only when lights are on. Light switch is mounted on exterior and interior door section. Electrical service required is 120 volt, 60 cycle, 1-phase. Electrical Contractor provides and installs conduit and wiring on inside ceiling of boxes. See Installation Instructions this section for additional requirements.

#### HEATED PRESSURE RELIEF VENT:

Walk Ins shall be equipped with a two-way heated pressure relief vent to equalize pressure between the interior and exterior caused by defrost cycles and opening of door. Electrical service to be 115v/60/1 phase.

#### FLOOR CONSTRUCTION:

THERMO-KOOL DURA-FLOOR: For additional stationary floor load strength of up to 12,000 lbs. per square foot THERMO-KOOL's DURA-FLOOR shall be provided which shall consist of an interior surface of foamed-in-place 1/8"

Aluminum Treadplate with high density urethane support structures foamed-in place on interior of floor panel and firmly attached to a foamed-in-place plywood subfloor.

#### TRIM AND ENCLOSURES:

Supply 1/8" treadplate wainscot on all exposed exteriors to match doors.

Cove base is required around all exposed sides.

Supply minimum of five (5)" high cove base on exposed walls of same material walk in exterior panels are made. Cove base shall be mounted with adhesive and sealed with BUTYL RUBBER SEALANT, 368, on top and bottom to control moisture from seeping under the walk ins. No external fasteners such as screws or pop rivets shall be applied as fastening for the cove base.

NOTE: Mount cove base then wainscot over the base so that it is the same height at the treadplate on doors.

Supply and install trim made from material with same finish as exposed exterior where walk-in cooler/freezer is adjacent to walls; seal to walls and boxes for rodent, dirt and moisture protection. Attach trim to box and wall with non-corrosive fasteners and seal to wall and box with clear silicon caulking. Extend trim to height of dropped ceiling, or

enclosure panel.

Enclosure Panel:

Supply and install enclosure (made from material with same finish as exposed exterior) panel or ceiling trim if height of box is lower than height of dropped ceiling. Enclosure panel to extend below seam between ceiling and wall panels of the walk-in. Attach panel to box with non-corrosive fasteners and seal to ceiling and box with clear silicon caulking. See Part 3, Installation Instructions, for type of clear silicon caulking to use.

Supply stainless steel hat channels to cover exposed control and refrigeration lines along building.

THRESHOLD:

A heavy gauge stainless steel threshold plate shall be provided with each door section.

THRESHOLD TO NOT EXCEED 15% ANGLE ON INTERIOR OR EXTERIOR

ALARM:

Walk-in shall be equipped with audio-visual alarm(s) that activate when temperature rises above desired setting. Alarm sensor is to be located in the return air stream of evaporator coil. Control panel shall be located at front of walk-in or at other pre-specified location. When temperature rises above predetermined setting a red light and buzzer activates. (Model (1) Thermo-Kool TK4700 walk-in monitor system with TK4 panic switch, motion detector, battery backups, dry contacts and thermostatically controlled heater wires).

REFRIGERATION:

Condensing units shall be factory assembled and UL approved. The condenser shall be air-cooled. Refrigerant for medium and low temperature systems shall be R448A

1 EA 1 1/2 HP, Remote Pre Assembled Refrig. System Model RFO180E4SEANT 208-230/60/3 Medium Temperature, base, weather hood, winter controls, Scroll, Air-cooled, R448A (8.7 Compressor RLA) with RL6A117ADASC 115/60/1 coil (1.6 amps) with Dual Speed EC motor.

1 EA 5 HP, Remote Pre Assembled Refrig. System Model RFO500L4SEB 208-230/60/3 Low Temperature, base, weather hood, winter controls, Scroll, Air-cooled, R448A, Std. Defrost Kit (17 Compressor RLA) with RL6E142DDASC 208-230/60/1 coil (1.5 fan amps, 14.3 heater amps) with Dual Speed EC motor.

Evaporators shall be forced air type with air flow parallel to the walk-in ceiling. Evaporators shall be a standard low profile series. (Electronically Comutated Motors required to meet 2009 Energy Code). All evaporator coil components shall be housed in heavy gauge aluminum housing. Units shall have drain pan with drain pipe connection.

Condensing unit voltage to be as specified by job site requirements.

Units shall have drain pan with drain pipe connection. Evaporators shall be equipped with an automatic electric defrost system including coil heaters, time clock, fan delay control, drain line heaters and liquid line solenoid.

The basic components shall be supplied for Remote Preassembled and shall include condensing unit, evaporator coil, control kit (pressure control, thermostat, liquid line drier, sight glass, suction line vibration eliminator, expansion valve and evaporator coil mounting kit), defrost timer, fan delay control and liquid line solenoid suction accumulator, and quick response controller (QRC). All parts shall be factory mounted.

Provide factory mounted suction accumulators-field installed will not be accepted.

Remote Preassembled the system requires tubing, electrical hook-up, drain line and refrigerant charge supplied by qualified refrigeration, electrical and plumbing contractors.

A low ambient kit and weatherproof housing shall be supplied with condensing units. The low ambient kit shall consist of a crankcase heater and headmaster valve.

NOTE: Supply single point electrical connection for all accessories with labeled wiring through door panels to top of wall in, in foamed in place conduit.

Copeland compressor/condensing units and Bohn or Russell evaporator coils are required.  
All work and materials are in full accordance with Local and/or State ordinances.

#### INSTALLATION INSTRUCTIONS:

Electrical Contractor will supply and run conduit and power wiring to cooler condensing unit and conduit and power wiring to freezer evaporator coil.

Electrical Contractor will supply and run conduit and control wiring from all coils to refrigeration control system. .

Electrical Contractor to supply conduit and wiring and make connections to and supply boxes provided and installed by the manufacturer for all lights, heated windows, door and sill heaters. Lights are not mounted by the factory. Food Service Equipment Contractor or approved installer to mount additional lights located on ceiling after walk-in box has been erected. Conduit and wiring for lights are supplied and installed by Electrical Contractor on the inside ceiling of the box. Electrical Contractor to provide conduit suitable for moist conditions. Conduit seal-offs are required for all electrical connections. All fasteners, etc., must be non-corrosive and mastic provided between dissimilar metals to prevent rusting.

Food Service Equipment Contractor to supply and install refrigeration lines. Food Service Equipment Contractor is responsible for determining length of lines needed.  
Condensation drain lines are supplied and installed by Food Service Equipment Contractor or approved installer.

Condensate heat tape shall be 208/1 and supplied by Food Service Equipment Contractor and wired into freezer evaporator by Electrical Contractor.

Installation will be performed by the Food Service Equipment Contractor or an approved professional refrigeration company with experience in the installation of walk-in Cooler/Freezer refrigeration systems.

The installation includes, but is not limited to the following:

Building the box.

Setting the compressor/condensing unit assemblies.

Hanging the evaporator coils - verify locations.

Installation of all accessories unless indicated otherwise.

Installation of all refrigeration lines which includes supplying, running and connecting.

Installation of the drain lines - Verify locations; supply and install tubing.

Food Service Equipment Contractor seals and insulates all penetrations in the walk-in, regardless of who makes the penetration. Conduit seal-offs are required for all electrical connections and are supplied by the Electrical Contractor. Insulation and sealing is required between conduit and wiring and inside conduit where any type of connection or penetration is made. Food Service Equipment Contractor is responsible for informing and coordinating the use of conduit seal-offs by other contractors and for providing proper

insulation and sealing for all other penetrations when conduit seal-offs cannot be used.  
Perform start-up, test, check, and adjust all components and accessories and pull to proper operating temperatures. Walk-in Cooler/Freezer refrigeration systems to run for five consecutive days prior to equipment demonstrations.

Calibrate thermometers, etc.

Box is to be cleaned before refrigeration is started up. Cleaning includes all inside and outside surfaces.

Hard copper is required for entire job. All refrigerant piping is ACR copper tubing, hard drawn. Wrought copper sweat fittings are used on the hard-drawn tubing. Slope suction line down in direction of flow 1/8" per foot. Where vertical risers of more than 5 feet occur in a suction line, the riser is trapped at the bottom.

Refrigeration system is set for four defrost cycles as a minimum (two defrost cycles for cooler) with each cycle in defrost 30 minutes as a minimum. Defrost times are set at times other than the initial arrival of the employees or periods of heavy usage during the morning and are identified in the Operation and Maintenance Manuals. Training on re-setting defrost times is provided to Owner during training.

System is ready for use when the Owner is prepared to occupy the operation.

#### General Contractor Information:

Steel reinforced concrete pad for walk-in box is prepared and supplied by General Contractor. See Food Service Equipment Contractor's supplied drawings and shop drawings for dimensions. Pad area must be transit level and trowel smooth and capable of sustaining weight of box and contents.

RECESSED TO BE DETERMINED BY TILE AND GROUT THICKNESS IN KITCHEN PLEASE CONFIRM WITH GENERAL CONTRACTOR.

Roof curbs (if required) are to be Food Service Equipment Contractor provided and install by the General Contractor.

All penetrations, including but not limited to, roof, wall and floor are provided by the General Contractor. Verification by the General Contractor with the Food Service Equipment Contractor as to location and size is required.

Sprinkler heads inside or over units must be loaded with a dry fire suppression substance.

Plumbing lines (supply, waste, drain, roof drain, sewer, condensation, slurry, etc.) cannot be routed over walk-in boxes.

#### WARRANTIES:

One-year parts, service, labor, mileage, time and transportation warranty on all parts supplied and all work performed.

Five-year non-prorated replacement warranty for the compressor/ condensing unit assemblies.

Five-year service and parts warranty.

#### ITEM 13 DUNNAGE RACKS

QTY: 2

MANUFACTURER: NEW AGE

MODEL: 1 EA 2006: 20 X 12 X 60

##### Description:

All welded aluminum construction, 1-1/2" x 1-3/4" x 0.070 tubing, welded aluminum caps on feet, weight capacity 3000 lbs., NSF, Made in USA

Lifetime warranty against rust & corrosion, 5 year workmanship and material defects warranty, standard

APPROVED ALTERNATES IF MATCH THE DETAILED SPECIFICATIONS: CHOICE EQUIP.

#### ITEM 14 COOLER SHELVING STATIONARY

QTY: 1-LOT

MANUFACTURER: METRO  
MODEL: METROMAX 4 AS DETAILED BELOW  
4-Tier Stationary Shelving Unit

All-polymer corrosion proof shelving with removable open grid or solid shelf mat section. Shelf mats, beams, and posts have built-in Microban® antimicrobial product protection. Rigid four-sided shelf frame and robust corner with complete 360° capture of the wedge and post ensure stability, strength, and structural integrity. Stationary units have maximum capacity of 2,000 lbs. evenly distributed. Mobile units offer a maximum total unit load of 750 lbs. All bottom tier shelves to use solid shelf mats. NSF Listed for all environments.

Each Stationary Unit to Consist of Sizes and Quantities as Drawn

4 ea MX74P 74" H Polymer Shelf Posts  
3 ea MAX4-\*\*\*\*G Shelf with Grid Mat  
1 ea MAX4-\*\*\*\*F Shelf with Solid Mat  
Use MetroMax 4® "S" Hook Kits as Drawn

Description:

Four tier shelving bottom shelf is 8" AFF and other three shelves are evenly spaced. See drawing for sizes and location of shelving. "S" hooks are approved where shown on drawing.

ITEM 15: COOLER SHELVING MOBILE

QTY: 1-LOT

MANUFACTURER: METRO

MODEL: MetroMax 4®

3-Tier Mobile Shelving Unit

All-polymer corrosion proof shelving with removable open grid or solid shelf mat section. Shelf mats, beams, and posts have built-in Microban® antimicrobial product protection. Rigid four-sided shelf frame and robust corner with complete 360° capture of the wedge and post ensure stability, strength, and structural integrity. Stationary units have maximum capacity of 2,000 lbs. evenly distributed. Mobile units offer a maximum total unit load of 750 lbs. All bottom tier shelves to use solid shelf mats. Bottom shelf must be on groove #5 on the caster post. NSF Listed for all environments.

Each Unit to Consist of Sizes and Quantities as Drawn

4 ea MX54UP 54" H Polymer Caster Post  
2 ea MAX4-\*\*\*\*G Shelf with Grid Mat  
1 ea MAX4-\*\*\*\*F Shelf with Solid Mat  
2 ea 5PCX Polymer Stem Caster and Bumper Corrosion Resistant no Brake  
2 ea 5PCBX Polymer Stem Caster and Bumper Corrosion Resistant with Brake

Description:

Three tier shelving bottom shelf is 8" AFF and other two shelves are evenly spaced. See drawing for sizes and location of shelving. "S" hooks are approved where shown on drawing. (Mobile shelving is to be located under coils in walk in. IF coil location is different than original layout adjustments of shelving are the responsibility of the FSC.)

ITEM 16 FREEZER SHELVING STATIONARY

QTY: 1-LOT

MANUFACTURER: METRO

MODEL: METROMAX 4 AS DETAILED BELOW

4-Tier Stationary Shelving Unit

All-polymer corrosion proof shelving with removable open grid or solid shelf mat section. Shelf mats, beams, and posts have built-in Microban® antimicrobial product protection. Rigid four-sided shelf frame and robust corner with complete 360° capture of the wedge and post ensure stability, strength, and structural integrity. Stationary units have maximum capacity of 2,000 lbs. evenly distributed. Mobile units

offer a maximum total unit load of 750 lbs. All bottom tier shelves to use solid shelf mats. NSF Listed for all environments.

Each Stationary Unit to Consist of Sizes and Quantities as Drawn

4 ea MX74P 74" H Polymer Shelf Posts  
3 ea MAX4-\*\*\*\*G Shelf with Grid Mat  
1 ea MAX4-\*\*\*\*F Shelf with Solid Mat  
Use MetroMax 4® "S" Hook Kits as Drawn

Description:

Four tier shelving bottom shelf is 8" AFF and other three shelves are evenly spaced. See drawing for sizes and location of shelving. "S" hooks are approved where shown on drawing.

ITEM 16.1 DUNNAGE RACKS

QTY: 2

MANUFACTURER: NEW AGE

MODEL: MODIFIED: 2006: 20 X 12 X 60

Description:

All welded aluminum construction, 1-1/2" x 1-3/4" x 0.070 tubing, welded aluminum caps on feet, weight capacity 3000 lbs., NSF, Made in USA

Lifetime warranty against rust & corrosion, 5 year workmanship and material defects warranty, standard

APPROVED ALTERNATES IF MATCH THE DETAILED SPECIFICATIONS: CHOICE EQUIP.

ITEM 17: FREEZER SHELVING MOBILE

QTY: 1-LOT

MANUFACTURER: METRO

MODEL: MetroMax 4®

3-Tier Mobile Shelving Unit

All-polymer corrosion proof shelving with removable open grid or solid shelf mat section. Shelf mats, beams, and posts have built-in Microban® antimicrobial product protection. Rigid four-sided shelf frame and robust corner with complete 360° capture of the wedge and post ensure stability, strength, and structural integrity. Stationary units have maximum capacity of 2,000 lbs. evenly distributed. Mobile units offer a maximum total unit load of 750 lbs. All bottom tier shelves to use solid shelf mats. Bottom shelf must be on groove #5 on the caster post. NSF Listed for all environments.

Each Unit to Consist of Sizes and Quantities as Drawn

4 ea MX54UP 54" H Polymer Caster Post  
2 ea MAX4-\*\*\*\*G Shelf with Grid Mat  
1 ea MAX4-\*\*\*\*F Shelf with Solid Mat  
2 ea 5PCX Polymer Stem Caster and Bumper Corrosion Resistant no Brake  
2 ea 5PCBX Polymer Stem Caster and Bumper Corrosion Resistant with Brake

Description:

Three tier shelving bottom shelf is 8" AFF and other two shelves are evenly spaced. See drawing for sizes and location of shelving. "S" hooks are approved where shown on drawing. (Mobile shelving is to be located under coils in walk in. IF coil location is different than original layout adjustments of shelving are the responsibility of the FSC.)

ITEM 18 48" X 30" WORKTABLE

QTY: 1

MANUFACTURER: KALTHOFF

MODEL: CUSTOM

Description:

Work Tables, 48"W x 30"D x 41"H, 14/300 stainless steel top, backsplash, legs, undershelf

& adjustable bullet feet, NSF

Accessories: (Per Table)

1. Drawer, 20"W x 20"D x 5"H, roller bearing slides & stainless steel drop in pan, stainless steel construction, NSF (2 per table): SEE FS100 FOR LOCATIONS & AMOUNT.
2. Casters, 5"H, (2) with brake (set of 4)
3. Sound Deadening.
4. Dimensions: 20(h) x 24(w) x 12(d)  
Shelf, cantilevered, 24"W x 12"D, 2" turn up at rear and both sides, 16/300 stainless steel construction, NSF Model MOD 2" turn up at rear and both sides of shelf with bull nose edging on front: SEE FS100 FOR LOCATION.

ITEM 19 EQUIPMENT STAND

QTY: 2

MANUFACTURER: F.W.E.

MODEL: OTR-15-MSWT

Description:

Equipment Stand with Wing Table, mobile, 25-1/2"W, (15) slides, fixed 1-1/2" OC, (15) 18" x 26" pan stand & (2) 18" x 26" pan wing table capacity, up to 500 lb weight capacity, pitched center drain, open base with undershelf, stainless steel construction, (4) 5" swivel polyurethane locking casters, NSF

ITEM 20 FOOD PROCESSOR

QTY: 1

MANUFACTURER: HOBART

MODEL: FS-250-1B

Description:

Food Processor, angled continuous feed design, full-size hopper, 17 lb per/min production capacity, 420 rpm, stainless steel cutting surfaces, planetary gear transmission, triple safety interlocks, aluminum housing, rubber feet, 15PLTSS-6PACK, 120/60/1, 3/4 HP, 8.0 amps, UL, NSF

Accessories:

Plate Racks (2 EACH)-hold 3 plates for processor.

ITEM 21 PREP TABLE WITH SINKS

QTY 1

MANUFACTURER: KALTHOFF

MODEL: CUSTOM

Description:

1 each: Work Table, 108"W x 30"D x 41"H, 14/300 stainless steel top, backsplash, legs, undershelf & adjustable bullet feet, NSF

See drawing FS-500 for location of sinks, drawer, shelf and undershelves.

Accessories:

1. MARINE EDGE
2. 2 ea Sink Bowl, fabricated, 1 ea 20"W x 20" front-to-back x 14" deep bowl and 1 ea 20"W x 20" front-to-back x 7.25" deep bowl, 16/201 stainless steel construction
3. Lever Drain, twist handle, includes handle bracket, 2" drain (Provided and installed by Titan Stainless)
4. Sink Cover, fits 20" x 20" sink bowl, 1/2" poly construction
5. Drawer, 20"W x 20"D x 5"H, roller bearing slides & stainless steel drop in pan, stainless steel construction, NSF
6. Shelf, cantilevered, 42"W x 12"D, 2" rear up turn, 16/300 stainless steel construction, NSF
7. Higher Backsplash-to be 8"
8. Bullet Foot, stainless steel
9. SD Sound Deadening

ITEM 21.1 PRE-RINSE FAUCET WITH ADD A FAUCET

QTY 1-LOT

MANUFACTURER: T & S BRASS

MODEL: B-0133-ADF10-B

Description:

Easy Install Pre-Rinse Unit, with wall bracket, wall mount base, 8" centers, 44" flexible hose with overhead spring body & B-0107 spray valve, 18" riser, add-on faucet with 10" swing nozzle, lever handles, 1/2" NPT female inlets, quarter-turn Eterna cartridges, low leaf

Accessories:

1. T&S Brass Model B-0230-K Installation Kit, (2) 1/2" NPT nipples, lock nuts & washers, (2) short "EII" 1/2" NPT female x male

ITEM 22 SPARE NUMBER

ITEM 23 PREP TABLE WITH SINKS

QTY 2

MANUFACTURER: KALTHOFF

MODEL: CUSTOM

Description:

1 each: Work Table, 108"W x 30"D x 41"H, 14/300 stainless steel top, backsplash, legs, undershelf & adjustable bullet feet, NSF

1 each: Work Table, 96"W x 30"D x 41"H, 14/300 stainless steel top, backsplash, legs, undershelf & adjustable bullet feet, NSF

See drawing FS-500 for location of sinks, drawer, shelf and undershelves.

Accessories:

1. MARINE EDGE
2. Bowl, fabricated, 1 ea 20"W x 20" front-to-back x 14" deep bowl stainless steel construction
3. Model LD-2-PKG Lever Drain, twist handle, includes handle bracket, 2" drain (Provided and installed by Titan Stainless)
4. Sink Cover, fits 20" x 20" sink bowl, 1/2" poly construction
5. Drawer, 20"W x 20"D x 5"H, roller bearing slides & stainless steel drop in pan, stainless steel construction, NSF
6. Model 4CTS-12 Shelf, cantilevered, 48"W x 12"D, 2" rear up turn, 16/300 stainless steel construction, NSF

NOTE: ONLY ONE HAS THE CANTLEVERED SHELF SEE DRAWING

7. Higher Backsplash-to be 8"
8. Bullet Foot, stainless steel
9. Sound Deadening

ITEM 23.1 PRE-RINSE FAUCET WITH ADD A FAUCET

QTY 2

MANUFACTURER: T & S BRASS

MODEL: B-0133-ADF10-B

Description:

Easy Install Pre-Rinse Unit, with wall bracket, wall mount base, 8" centers, 44" flexible hose with overhead spring body & B-0107 spray valve, 18" riser, add-on faucet with 10" swing nozzle, lever handles, 1/2" NPT female inlets, quarter-turn Eterna cartridges, low leaf

Accessories:

2. T&S Brass Model B-0230-K Installation Kit, (2) 1/2" NPT nipples, lock nuts & washers, (2) short "EII" 1/2" NPT female x male

ITEM 25 HAND SINK

QTY: 6

MANUFACTURERE: Advance Tabco

MODEL: 7-PS-59

Description:

Hand Sink, wall mounted, 14" wide x 10" front-to-back x 5" deep bowl, Deep Drawn™ sink bowl, 20 gauge 304 stainless steel, welded 7-3/4"H side splashes, heavy duty splash mounted gooseneck faucet, knee valve, basket drain, keyhole wall mount bracket, NSF, cCSAus

Accessories:

1. 8 ea Model 7-PS-10 P-trap, heavy duty, 1-1/2", 17 gauge

BK RESOURCES IS APPROVED ALTERNATE

ITEM 26 WASTE CONTAINERS  
MANUFACTURER: RUBBERMAID  
MODEL: FG353600GRAY  
Description:

QTY: 7 (3 SHOWN)

BRUTE® Container, square, without lid, 40 gallon, 23-1/2"D x 28-3/4"H, nesting handles, rounded corners & smooth contours, plastic construction, gray, NSF, Made in USA

Accessories:

- 7 ea Model FG353900GRAY BRUTE® Container Lid, square, 24"D x 2"H, for 3536 container, tight-fitting, gray, NSF, Made in USA
- 7 ea Model FG353000BLA BRUTE® Dolly, square, 17-1/4"D x 6-1/4"H, for 3526 and 3536 containers, 250 lb. capacity, black, NSF, Made in USA

ITEM 27 MICROWAVE/STEAMER  
MANUFACTURER: PANASONIC  
MODEL: NE-3280  
Description:

QTY: 1

PRO2 Sonic Steamer Microwave Oven, ventless, 3200 Watts, 1.6 cu. ft. capacity, connectionless, rethermalizer, (5) power levels, (4) heating elements, 3-stage cooking, 16 program memory capacity, digital display, dial timer, removable center shelf, see-thru drop down door, stainless steel cabinet & cavity, cULus, NSF

ITEM 28 SPARE NUMBER

ITEM 29 HOT WATER DISPENSER  
MANUFACTURER: HATCO  
MODEL: AWD-12

QTY: 1

ELECTRICAL: Reference Project drawings for electrical requirements.

Description:

Atmospheric Hot Water Dispenser, countertop design, 12-gallon capacity, automatic fill, pushbutton portion control, low water cut-off, electronic temp. control with digital display, red & white granite powder coated body, stainless steel tank, shelf & base

Accessories:

1. Model AWD-PLUMB 3 ft. rubber drain hose with 10 ft. 1/4" inlet tubing
2. Model AWD-FILTER Water filtration system with 10' of 1/4" tubing & fitting
3. FOOD SERVICE CONTRACTOR TO SUPPLY IN LINE VACCUM BREAKER TO PLUMBER IN FIELD FOR INSTALLATION.

ITEM 30 MIXER  
MANUFACTURER: HOBART  
MODEL: HL200-1STD

QTY: 1

ELECTRICAL: Reference Project drawings for electrical requirements.

Description:

TRANSMISSION: Gear-driven. Gears are constant mesh heat-treated hardened alloy steel along with anti-friction ball bearings. Grease lubricants furnished to all gears and shafts.  
Three Fixed Speeds plus Stir Speed  
Shift-on-the-Fly™ Controls

Soft start Agitation Technology

Magnetic contactor with thermal overload protection. Internally sealed "Start-Stop" push buttons. A 15-minute SmartTimer™ is standard. SmartTimer™ includes Automatic Time Recall, which remembers the last time set for each speed.

Ergonomic Swing-Out Bowl

Stainless Steel Bowl Guard

Hobart Quick Release™ agitators allow for simple installation and removal from agitator shaft  
BOWL GUARD: Heavy-duty stainless steel wire front and solid rear portion. Front portion of guard rotates easily to add ingredients and install or remove agitator. It detaches in seconds for cleaning in dishwasher or sink. Rear portion of guard can be quickly cleaned in position. Guard must be in closed position before mixer will operate. Bowl support interlock provides further protection.

BOWL LIFT: Ergonomic style, hand crank operated, self-locking in top and bottom position.

FINISH: Metallic Gray Hybrid Powder Coat finish.

ATTACHMENT HUB: Comes with front-mounted Hobart standard #12 taper attachment hub for use with Hobart #12 size attachments.

Accessories:

1. Stainless steel bowl
2. Aluminum "B" beater
3. Stainless steel "D" wire whip
4. Aluminum "ED" spiral dough arm
5. TABLEHW-HL2012 Mixer Table; 27"W x 32"D x 26"H, the top shelf is drilled for mounting an HL120 or HL200 mixer, includes 4 posts for storing attachments, a lower shelf for additional storage, & (4) locking 5" diameter wheels

ITEM 31-32 SPARE NUMBER

ITEM 32 SLICER

QTY: 1

MANUFACTURER: HOBART

MODEL: EDGE 13

Description:

Centerline by Hobart Edge Series Slicer, manual, med duty, angle feed, 13" carbon steel knife, carriage & gauge interlocks, no volt release, poly-v belt drive, permanent ring guard, removable anodized aluminum carriage & knife cover, top mounted sharpener, anodized aluminum finish, 120v/60/1-ph, 4.0 amp, 1/2 hp, cETLus, NSF

ITEM 34 PAN RACKS

QTY: 6

MANUFACTURER: NEW AGE

3 EACH MODEL 1655:

Description:

Mobile pan rack with 13 adjustable aluminum guides, bottom pans slides are welded in place. 4 1/2" OC for 12 x 20 to 18 x 26 pans, 1 1/2" centers, end loading, 5" platform swivel casters, NSF, MADE IN USA.

Lifetime warranty against rust and corrosion, 5 year workmanship and material defects warranty.

Accessories:

1. PS Pan Stop, aluminum strap welded to rear of unit (MUST BE FACTORY INSTALLED)

3 EACH MODEL 7331:

Description:

Bun pan rack, full height, open sides, with angle glides on 3" centers, capacity 20-18" x 26" sheet pans, all welded construction, end loading, 5" platform, NSF, MADE IN USA.

Lifetime warranty against rust and corrosion, 5 year workmanship and material defects warranty.

Accessories:

1. PS Pan Stop, aluminum strap welded to rear of unit (MUST BE FACTORY INSTALLED)
2. Provide four (5) vinyl rack covers for size rack specified. Provide covers as manufactured by Berner Corp. or Coverall, Division of Worcester Slitting and Manufacturing.  
Provide full height window on panel that rises.

APPROVED ALTERNATES IF MATCH THE DETAILED SPECIFICATIONS: CHOICE EQUIPMENT

ITEM 35-39 SPARE NUMBERS

ITEM 40 FULL SIZE MOBILE HEATED CABINET QTY: 1 (EXISTING)  
FOOD SERVICE CONTRACTOR TO RELOCATE

ITEM 41 EXHAUST HOOD QTY: 1-LOT  
NOT IN CONTRACT BY OTHER TRADES

ITEM 41.1 UTILITY DISTRIBUTION SYSTEM (UDS) QTY: 1  
MANUFACTURER: CAPTIVEAIRE  
MODEL: CUSTOM  
ELECTRICAL: Reference Project drawings for electrical requirements.

Description:

A Utility Distribution System shall provided be as indicated on drawings. Systems shall have two vertical risers, one on each end, with one dedicated to electrical and the other to plumbing. The horizontal distribution raceway between the risers shall be separated into electrical and plumbing compartments and each shall be completely enclosed and water tight with removable access panels. The risers and raceway shall be constructed of 16 gauge, type 304 stainless steel, #4 finish. A circuit protected dual convenience outlet shall be provided on each riser. Service connections shall be located behind easily removable access panels.

Approvals: Unit(s) shall be ETL Listed to US and Canadian Standards, ETL Sanitation Listed, AGA and MA approved.

General Construction and Features

- Electrical Riser: Main power connection shall be made to the main circuit breaker which has a shunt trip and is mounted in the electrical riser. <sup>[[1]]</sup><sub>SEP</sub>
- Wireway systems: Electrical power shall be fed through a main circuit breaker to a distribution panel which contains individual branch breakers. Each appliance is fed from the individual breakers which are wired to each receptacle located along the raceway. <sup>[[1]]</sup><sub>SEP</sub>
- Plumbing Riser: The plumbing riser shall house manual (quarter-turn) shut-off valves for each incoming main supply line located in the UDS. The plumbing manifolds shall be provided with stub-outs along the raceway for the individual plumbing connections. Each stub-out shall be equipped with a manual (quarter-turn) shut-off valve. <sup>[[1]]</sup><sub>SEP</sub>
- Expandability: All electrical systems are designed for additional capacity for future expansion or upgrade of connected appliances. <sup>[[1]]</sup><sub>SEP</sub>
- Wireway: Electrical distribution panel located in the riser shall be equipped with branch circuit breakers and sized for expansion. <sup>[[1]]</sup><sub>SEP</sub>
- Serviceability and Accessibility: Lift out doors shall provide easy access to risers without moving cooking equipment, in most cases. Removable panels provided along the length of the raceway shall allow access to either plumbing or electrical compartments. <sup>[[1]]</sup><sub>SEP</sub>
- Electric Outlets and Cord Sets: All outlets shall provide moisture resistant covers and have been sized per NEMA standards. Each is supplied with a matching cord and plug set if these are not already supplied by the equipment manufacturer. Twist-lock sets are standard in island applications. All 120V, single phase 15 and 20 amp receptacles are DCO-GFI. <sup>[[1]]</sup><sub>SEP</sub>
- Main Disconnect: One point disconnect through a main circuit breaker equipped with a 120 VAC rated shunt trip provided in the riser. <sup>[[1]]</sup><sub>SEP</sub>

- Gas Solenoid Valve: Electrical or Mechanical. Electrical valves shall be provided with a manual reset button and time delay relay to prevent pilot lights from going out in momentary power outages.
- Shunt Trip: Shall be provided with each main breaker. [L] [SEP]
- Appliance Protection: Each electrical outlet connection shall be protected with an individual circuit breaker.

#### Electrical

- Wireway Systems: The electrical system shall consist of a main circuit breaker which feeds power to a distribution panel located in the electrical riser containing individual branch breakers. Each appliance is fed from the individual breakers which are wired to each receptacle located along the raceway and shall be completely isolated from the plumbing supply manifolds. The main circuit breaker shall be equipped with a built-in 120 VAC rated shunt trip and shall be located in the electrical riser requiring a single point incoming connection. Terminal block connections shall be provided for field interconnection between the shunt trip and the fire protection system for power shut-off in the event of a fire. All outlets shall be equipped with grounding type receptacles having specific NEMA polarized configurations and located on the under side (Model UDI) or front side (Model UDW) of the raceway at each equipment location. Outlets are matched to the cord and plug sets supplied with equipment. On the Model UDI, all 120V, single phase 15 and 20 AMP receptacles are DCO-GFI. Twist lock cord and plug sets are provided for equipment supplied without cords. On the Model UDW, straight blade cord and plug sets are provided for equipment supplied without cords. [L] [SEP]
- Main Circuit Breaker: 120/208/3 50 AMP

#### Plumbing

- The plumbing compartment shall be completely isolated from the electrical with all piping labeled. [L] [SEP]
- Hot and cold water and steam supply and return manifolds shall be insulated. [L] [SEP]
- All incoming service connections shall be provided with 1/4 shut-off valve. Each branch connection shall be provided with 1/4 shut-off valve, with color coded hoses, and located at each equipment location. [L] [SEP]
- Color coded quick disconnect hoses are provided for connection to equipment. [L] [SEP]
- Hot and cold water piping, including branch connections, shall be type "L" copper tubing. All fittings will be copper sweat soldered (95-5 type). [L] [SEP]
- Gas and steam piping, including branch connections, shall be threaded black iron. There shall be a drip tee on the incoming gas end. The gas manifold shall be furnished with either an electrical or mechanical gas valve which shall be field interlocked with the fire protection system to shut off fuel sources in the event of a fire. Electrical gas valves shall be furnished with a manual gas reset button and time delay relay to prevent pilot lights from going out in momentary power outages, located in the UDS riser. [L] [SEP]
- Gas manifolds are sized for an inlet pressure of 7" WC for natural gas or 11" WC for LP.

#### Gas Equipment

All gas equipment shall conform to local-Code requirements

- Manifold (looped): 3/4" to 3" IPS [L] [SEP]
- 1/4 turn manual shut-off valve on manifold [L] [SEP]
- Quick disconnect hoses: 1/4" to 1-1/4", up to 6' long [L] [SEP]
- Quick disconnect fittings: 1/4" to 1-1/4" with 1/4 shut-off valves

#### Hot and Cold Water-

- Manifold: 3/4"
- 1/4 turn manual shut-off valve on manifold [L] [SEP]
- Quick disconnect hoses: 1/4" to 1", up to 6' long [L] [SEP]
- Quick disconnect fittings: 1/4" to 1" with 1/4 shut-off valves [L] [SEP]

#### Options

- Remote Status Indicator Panel: Lighted panel indicates status of receptacles in wireway system.
- Electric Outlets & Cord Sets: Water tight pin and sleeve outlets and cords.
- Light & Fan Switches located in riser.
- Hood Control Panel built into riser.
- Swivel Connectors for gas equipment.
- Plumbing Fixtures: Pre-plumbed and installed faucets, mixing valves, hose reels, water filtration systems. YES THERE WILL BE ONE REQUIRED TO BE INCLUDED IN THE UDS. SEE ITEM 50 COMBINATION OVENS WITH WATER FILTER
- Cable Restraints: Available for mobile equipment.
- Temperature/Pressure Gauges for hot/cold water main.

Factory Tested

Unit(s) shall be operated, tested and set at the factory using job-site conditions for electrical and gas input. All operating and safety controls shall be tested and set at the factory.

Service and Parts

The supplier shall furnish gas piping schematics, as built wiring connection and control-circuit diagrams, dimension sheets and a full description of the unit(s). Service manuals showing service and maintenance requirements, shall be provided with each unit.

ITEM 42 40 GALLON GAS TILT KETTLE

QTY: 1

MANUFACTURER: CLEVELAND

MODEL: KGL40TSH

Description:

Dimensions: 41(h) x 49.38(w) x 47.25(d)

Short Series™ Steam Jacketed Kettle, gas, tilting, 40-gallon capacity, full steam jacket design, 316 stainless steel interior, 38" rim height, floor mounted control console supports, 304 stainless steel construction, flanged feet, 50 psi rating, electronic spark ignition, 140,000 BTU

1-year parts & labor warranty, standard

Extended Warranty, not to exceed 36 months from date of installation (K-12 Schools only)

10-Year Hemispheric Bottom Warranty (K-12 Schools only)

Performance start-up included at customer request after equipment is installed

120v/60/1-ph, 10.0 amps, electronic spark ignition, cord & plug for controls, standard

Accessories

1 ea No draw-off, standard

1 ea Model FS40SHG Food Strainer, 40 gallon, for gas short series kettles, stainless steel

1 ea Model CHS40GTSH Spring-assisted cover (40 gallon)

1 ea Model PRSK Double Pantry Pre-Rinse Spray Hose (P/N B-0113) INCLUDE FAUCET AND INLINE VACCUUM BREAKER (FSC TO SUPPLY AND GIVE TO PLUMBER IN FIELD TO INSTALL.

1 ea Model FBKT Faucet Bracket (required for mounting faucet)

1 ea Model PCK Pan Carrier, for all floor model kettles 25 gal & larger except KDM-25-T

1 ea Model KAK Kettle Accessory Kit, includes: clean up brush, paddle, stainless steel whip, brush, draw-off brush, ladle

APPROVED ALTERNATES IF MATCH THE DETAILED SPECIFICATIONS: VULCAN

ITEM 43 40 GALLON GAS TILT BRAISING PAN

QTY: 2

MANUFACTURER: CLEVELAND

MODEL: SGL40TR

Description:

Dimensions: 42(h) x 48(w) x 40(d)

DuraPan™ Tilting Skillet, gas, 40-gallon capacity, modular open base, standard with hydraulic hand tilt with quick lowering feature, stainless steel construction, includes spring-assisted cover, gallon

markings and electronic spark ignition, stainless steel level adjustable feet, 130,000 BTU, CE, NSF, IPX6

1-year parts & labor warranty, standard

Extended Warranty, not to exceed 36 months from date of installation (K-12 Schools only)

10 Year Pan warranty (K-12 Schools only)

Performance start-up included at customer request after equipment is installed

Natural Gas

120v/60/1-ph, 1.8 amps NEMA 5-15P, standard

Accessories per pan:

1 ea Model PT1 Power Tilt, with hand tilt override

1 ea Model PCS Pan Carrier, for floor models

1 ea Model PRSS H/C Pre-Rinse Spray Head with hose (P/N B-0113) INCLUDE FAUCET AND INLINE VACCUM BREAKER (FSC TO SUPPLY AND GIVE TO PLUMBER IN FIELD TO INSTALL.

1 ea Model FBSTR Faucet Bracket for R series floor model skillets

1 ea Model FSSK Food Strainer, 30 & 40 gallon, for braising pans

APPROVED ALTERNATES IF MATCH THE DETAILED SPECIFICATIONS: VULCAN

#### ITEM 44 INDUCTION RANGE

QTY: 1

MANUFACTURER: CookTek

MODEL: 604701

Description:

Dimensions: 3.73(h) x 13.75(w) x 27.5(d)

(MCD3002F) Heritage Induction Range, drop-in, double hob (front-to-back), glass-ceramic top, individual burner control knobs, microprocessor with (20) power cook settings & auto shut-off, self-diagnostics, automatic pan detection, LED display, integral cooling fan, patch cable from unit to box included, stainless steel & aluminum housing, 6 ft. cord, 200-240v/50/60/1-ph, 6000 watts, 26.0 amps, cETLus, NSF, CE, Made in USA

Two year limited parts and labor warranty in US/Canada only and 7 year enrollment in the CookTek Advanced

Replacement Program (ARP)

Destination - US United States or Canada, NEMA 6-50P

Accessories:

1. Model 105211 Saute Pan, 12", 2.5mm tri-ply stainless steel with aluminum core, cast stainless steel tube handles and rivets
2. Model 105213 Everyday Pan, with cover, 12", 5 qt., 2.5mm tri-ply stainless steel with aluminum core, cast stainless steel handles and rivets
3. Model 105215 Sauce Pan, with cover and helper handle, 4 qt., 2.5mm tri-ply stainless steel with aluminum core, cast stainless steel tube handles and rivets
4. Model 105216 Stock Pot, with cover, 12 qt., 2.5mm tri-ply stainless steel with aluminum core, cast stainless steel handles and rivets

#### ITEM 45 INDUCTION CABINET

QTY: 1

MANUFACTURER: KALTHOFF

MODEL: CUSTOMER

Description:

16" x 34" Table Cabinet with flat top, hinged doors, midshelf, s/s legs, and adjustable s/s bullet feet.

16/300 s/s top and 18/430 s/s body, nsf

Accessories:

Table Cut, large (16" x 16" or more)

Control Panel Bracket, for drop in

Buy Out Installation, Wiring not Included, Buy Out provided by FSC

Cord & Plug Access At Rear

ITEM 46 DOUBLE ELECTRIC CONVECTION OVENS

QTY: 2 STACKS

MANUFACTURER: BLODGETT

MODEL: MARK V-100 DOUBLE

Description:

Dimensions: 70.63(h) x 38.25(w) x 36.88(d)

Convection Oven, electric, double-deck, standard depth, capacity (5) 18" x 26" pans per compartment, (SSD) solid state digital controls, 2-speed fan, interior light, simultaneous operated doors with glass, stainless steel front, sides & top, vent connector, 6" stainless steel legs, vent connector, 11.0 kw each, 1/3 hp, cETLus, CE, NSF, ENERGY STAR® (Ships within 5 days) 3 year parts, 2 year labor and 2 additional year door warranty (parts only), standard

480v/60/3-ph, 11.0 kW, 14.0 amps (per deck)

Model SSI-M Top Oven: Solid State infinite control with 60 min. manual timer

Model SSD Bottom Oven: Solid State digital with Pulse Plus® and Cook & Hold, standard 6" legs, adjustable, stainless steel (set), standard

ITEM 47 SPARE NUMBER

ITEM 48 FLOOR TROUGH

QTY: 3

MANUFACTURER: IMC/TEDD7

MODEL: ASFT-1836-SG

Description:

Dimensions: 12.25(h) x 36(w) x 18(d)

ASFT Anti-Spill Floor Trough, 36"W x 18"D, 6" deep receptacle, (1) 4" OD tailpiece, stainless steel beehive strainer, 14/304 stainless steel, brushed satin finish, (SG) subway grating, NSF, Made in USA

Fabricators which are pre-approved for construction of stainless steel custom fabrication (serving line equipment excluded) are: Low Temp Manufacturing, Jonesboro, GA.; Titan Stainless, Pageland, SC and Advance Tabco.

ITEM 49 CONVECTION STEAMER, GAS

QTY: 1

MANUFACTURE: MARKET FORGE

MODEL: ETP-10G

Description:

Dimensions: 76.25(h) x 24(w) x 33(d)

(QUICK SHIP) ECO-TECH™ PLUS Convection Steamer, floor model, gas, (2) compartments, (5) 12" x 20" x 2-1/2" pan capacity, atmospheric steamer, self contained water filter, automatic water fill, individually controlled by power switch, 60 minute timer, (4) flanged feet, stainless steel interior & exterior, 84,000 BTU, ENERGY STAR® (ships within 14 days, maximum quantity = 2 per order)

Standard (1) one year parts & labor warranty, equipment only

Optional second year parts & labor warranty, equipment only, per unit (for K-12 schools only)

Natural gas

120v/60/1-ph, 2.0 amps, standard

Accessories:

1 ea Model 71528241-SB TruH2O 210MS2 Water Treatment System, 10" cartridge, with Citryne, eliminates scale, chlorine, bad tastes & odors, 1 micron filtration, 1.67 GPM

APPROVED ALTERNATES IF MATCH THE DETAILED SPECIFICATIONS: VULCAN AND CLEVELAND

ITEM 50 PASS THRU TABLE

QTY: 1

MANUFACTURE: KALTHOFF

MODEL: CUSTOM

Description:

Dimensions: 35.5(h) x 60(w) x 36(d)

Work Table, 60"W x 36"D, cabinet base with sliding doors ON BOTH SIDES, 14 gauge 304 stainless steel top, stainless steel legs with adjustable BULLET feet, NSF

Accessories:

MARINE EDGE

Side Splash, 5" high (each)-AT WALLS ONLY-CONFIRM 8" BLOCK WALLS

DOOR LOCKS WITH KEYS FOR BOTH SIDES.

ITEM 51 SINGLE DOOR PASS THRU HEATED CABINET

QTY: 2

MANUFACTURER: TRAUlsen

MODEL: AHF132WP-FHG

ELECTRICAL: Reference Project drawings for electrical requirements.

Description:

Spec-Line Heated Cabinet, Pass-thru, one-section, stainless steel exterior, aluminum interior, standard depth cabinet, full-height glass door or doors with Santoprene® EZ-Clean Gaskets, (3) clear coated adjustable shelves per section, microprocessor contr

3 year service/labor warranty, standard

Door hinging to be determined-SEE DRAWINGS

Accessories:

1. PER CABINET: 9ea EZ-change heavy duty universal trayslide - per pair
2. GLASS DOORS ON KITCHEN SIDE ONLY

APPROVED ALTERNATES IF MATCH DETAILED SPECIFICATIONS: TRUE

ITEM 52 SINGLE DOOR PASS THRU REFRIGERATED CABINET

QTY: 2

MANUFACTURER: TRAUlsen

MODEL: AHT132WPUT-FHG

ELECTRICAL: Reference Project drawings for electrical requirements.

Description:

Spec-Line Refrigerator, Pass-thru Display, ONE-section, self-contained refrigeration, StayClear™ Condenser, stainless steel exterior, aluminum interior, standard depth, wide full-height glass door or doors with Santoprene® EZ-Clean Gaskets, interior light

3 year service/labor, 5 year compressor warranty, standard

Standard refrigerant, standard

Door hinging to be determined-SEE DRAWINGS

Accessories:

1. PER CABINET: 9ea EZ-change heavy duty universal trayslide - per pair
2. PER CABINET: Provide evaporator wicking pads. INSTALLATION IS REQUIRED BY LOCAL HOBART SERVICE. See detail DT01AS at end of written specifications.
3. GLASS DOORS KITCHEN SIDE ONLY

APPROVED ALTERNATES IF MATCH DETAILED SPECIFICATIONS: TRUE

ITEM 54 DUNNAGE RACK

QTY: 1

MANUFACTURER: NEW AGE

MODEL: 2006: 20 X 12 X 60

Description:

All welded aluminum construction, 1-1/2" x 1-3/4" x 0.070 tubing, welded aluminum caps on feet, weight capacity 3000 lbs., NSF, Made in USA

Lifetime warranty against rust & corrosion, 5 year workmanship and material defects warranty, standard

APPROVED ALTERNATES: CHOICE EQUIP

ITEM 53 TRAY AND SILVERWARE CARTS MANUFACTURER: CAMBRO MODEL: TC1418110 Description: Dimensions: 45.5(h) x 32.38(w) x 21.25(d) Tray & Silver Cart, 32-3/8"L x 21-1/4"W x 45-1/2"H, 180-200 tray capacity, includes vinyl cover & (8) clear pans for flatware, napkins & non-perishable condiments, (4) 6" swivel casters, 2 with brake, polyethylene, black, NSF	QTY: 2
ITEM 54 HOT FOOD COUNTER TO BE RELOCATED BY FSC	QTY: 1(EXISTING)
ITEM 55 COLD FOOD COUNTER TO BE RELOCATED BY FSC	QTY: 1(EXISTING)
ITEM 56 FLAT TOP COUNTER WITH PANEL BOX TO BE RELOCATED BY FSC	QTY: 1(EXISTING)
ITEM 57 CASHIER UNITS TO BE RELOCATED BY FSC	QTY: 1(EXISTING)
ITEM 58-59 SPARE NUMBERS	
ITEM 60 MILK BOXES TO BE RELOCATED BY FSC	QTY: 2 (EXISTING)
ITEM 61 HOT FOOD COUNTER	QTY: 1 (FUTURE)
ITEM 62 COLD FOOD COUNTER	QTY: 1 (FUTURE)
ITEM 63 FLAT TOP WITH PANEL BOX	QTY: 1 (FUTURE)
ITEM 64 CASHIER STAND	QTY: 1 (FUTURE)
ITEM 65 ICE CREAM BOX TO BE RELOCATED BY FSC	QTY: 1 (EXISTING)
ITEM 66-70 SPARE NUMBERS	
ITEM 71 HOSE REEL T&S Brass Model B-2339-02 Hose Reel Assembly, enclosed, with 3/8" x 30' ft. hose., flush mount stainless steel control cabinet with locking latch, 1/2" in-line check valves, dual check valve backflow preventer, shut-off valve with 4-arm handle, bi-metallic thermometer with 3" dia. dial face, continuous pressure vacuum breaker, ratcheting system, high flow stainless steel water gun with rubber cover & front style trigger, water hammer arrestor, includes multi-fit bracket, (2) 1/2" NPT female union inlets, 1/2" NPT outlet	QTY: 2
ITEM 72: ICE MACHINE AND BIN MANUFACTURER: HOSHIZAKI MODEL: F-450MAJ-C ELECTRICAL: Reference Project drawings for electrical requirements. Description: Dimensions: 22(h) x 22(w) x 27.38(d)	QTY: 1

Ice Maker, Cubelet-Style, 22"W, air-cooled, self-contained condenser, production capacity up to 412 lb/24 hours at 70°/50° (316 lb AHRI certified at 90°/70°), stainless steel finish, compressed cubelet style ice, Advanced CleanCycle24™, R-404A refrigerant, 115v/60/1-ph, 10.8 amps, NSF, UL

Warranty: 3-Year parts & labor on entire machine

Warranty: 5-Year parts on compressor & air-cooled condenser

Accessories:

1 ea Model B-300SF Ice Bin, 22"W, top-hinged front-opening door, 300-lb ice storage capacity, for top-mounted ice maker, stainless steel exterior, 6" painted flange legs included, protected with H-GUARD Plus Antimicrobial Agent, ETL, ETL-Sanitation

Warranty: 3-Year parts & labor for bin

1 ea Model H9320-51 Water Filtration System, single configuration, 18.4" H (manifold & cartridge)

1 ea Warranty: 1-Year on entire water filtration system & replaceable elements, standard  
APPROVED ALTERNATES IF MATCH DETAILED SPECIFICATIONS: SCOTSMAN AND MANITOWAC

ITEM 72.1: FILTER FOR ICE MACHINE  
MANUFACTURER: HOSHIZAKI/EVERPURE  
MODEL: H9320-51 and 9795-80

QTY: 1

Description:

Water Filtration System, single configuration, 18.4" H (manifold & cartridge)

Pre-Filter System, E-10 Prefilter, NSF

Accessories:

1. Supply 2 ea replace filters and pre-filter

ITEM 73 SPARE NUMBER

ITEM 74 ICE MACHINE AND BIN  
MANUFACTURER: SCOTSMAN  
MODEL: HID540AB-1

QTY: 2

ELECTRICAL: Reference Project drawings for electrical requirements.

Description:

Dimensions: 41(h) x 21.25(w) x 24.38(d)

Meridian™ Ice & Water Dispenser, push-button dispensing, H2 Nugget Ice, air-cooled, production capacity up to 500 lb/24 hours at 70°/50° (365 lb AHRI certified at 90°/70°), 40 lb bin storage capacity, sealed maintenance-free bearings, removable bin, removable air filter, SmoothStream™ water dispensing, removable spouts and sink, enlarged 0.8" sink drain, recessed utility chase, stainless steel evaporator and auger, enlarged 11" dispensing area, USB software upgrade port, unit specific QR code, stainless steel exterior, AgION™ antimicrobial protection, R-404a refrigerant, includes 7.5' power cord with NEMA 5-15P plug, 115V/60/1, 9.0 amps, cULus, NSF, CE, engineered and assembled in USA

3 year parts & labor warranties

5 year parts on compressor & condenser

Accessories:

1 st Model KLP24A 4" Adjustable legs, plastic with metallic foot for HID models (set of 4)

1 ea Model AP1-P AquaPatrol™ Plus Water Filtration System, single system, 2.1 gallons per minute max flow, designed for cubers up to 650 lb, and for flakers, nuggets & nugget dispensers up to 1,200 lb, cULus, NSF

1 ea Model APRC1-P AquaPatrol™ Plus Water Filter Replacement cartridge (1 each), cULus, NSF

ITEM 75 BEVERAGE COUNTER  
MANUFACTURER: KALTHOFF

QTY 1

MODEL: CUSTOM

ELECTRICAL: Reference Project drawings for electrical requirements.

Description:

- Continuous piece 'fully enclosed base' style construction
- 14 gauge stainless steel counter top with #8 high polished edges, extended to serve as tray rest, turndown at all free sides
- Counter front to consist of plastic laminate clad millwork doors stainless steel body reveal between panels. Color selection by owner/architect.
- Fully welded angle iron frame utilizing 1.5" x 1.5" x 1/8" galvanized angle. Welds to be ground smooth and sprayed with silver enamel paint. Angle Iron to be framed around each cutout for drop-in-equipment. Angle iron to run front-to-back and at each mullion. 1/2" sound deadening tape to be applied to top of angle iron frame prior to installation of countertop.
- All stainless steel fabrication to be fully welded. Butt or knuckle joints will not be accepted.
- Stainless steel internal shelving compartments, fully enclosed back, sides, and top. Utility access panels at rear (to be determined-see connection drawings), coved corners. All internal stainless steel fabrication to be fully welded.
- Supply two 3" round cut outs with grommets for cords, plugs and water from below counter height.
- Supply stainless steel drain trough 3' include piping to floor sink under beverage counter.(confirm location before production)
- Provisions for the following KEC furnished items: #74
- Stainless steel legs and adjustable bullet feet
- Stainless steel removable kickplate

ITEM 76 TRAY DRYING RACKS

QTY: 3 (3 SHOWN)

MANUFACTURER: METRO

MODEL: MAX4-PR48VX4

Description:

MetroMax® 4 Mobile Drying Rack Unit, 48"W x 24"D x 68"H, 4-tier, for trays/cutting boards/sheet pans & steam pans, includes: (4) open shelf frames, (4) 63" mobile posts, (2) cutting board/tray drying racks, (2) pan racks, (4) polymer swivel casters (2 with brakes), built in Microban® antimicrobial product protection, NSF

ITEM 77 SOILED DISHTABLE STRAIGHT

QTY: 1

MANUFACTURER: KALTHOFF

MODEL: CUSTOM

Dimensions: 43(h) x 72(w) x 30(d)

Description:

Soiled Dishtable, 72" end to machine, STRAIGHT, left to right operation, 20" x 20" x 8"D pre-rinse sink, with removable perforated basket with runners for tray racks to slide across, 14/300 stainless steel top, stainless steel H-frame legs, NSF

Capped and Finished Endsplash, 30" front-to-back, includes end splash  
8" Backsplash

Faucet Holes (Set) MODIFIED LOCATION

Raised Rolled Edge

Scrap Block, 6-1/2" dia., rubber

Model BF-S Bullet Foot, stainless steel

Model SD Sound Deadening

ITEM 78 HOSE REEL

QTY: 1

MANUFACTURER: FISHER

MODEL: 29851

Description:

Hose Reel Assembly, closed reel rinse wall mounted with spray valve, powder coated steel construction, 30 feet of 3/8"ID, 3 ply hose, working pressure of 200 psi, withstands 160° F water temperature, 1/2" NPT Female garden hose inlet

Accessories:

1. Model 28231 Reel Rinse Installation Kit, wall-mounted

APPROVED ALTERNATES IF MATCH THE DETAILED SPECIFICATIONS: T AND S BRASS

ITEM 79          SPARE NUMBER

ITEM 80          DISHWASHER

QTY: 1

MANUFACTURER: HOBART

MODEL: CL66-DWR+BUILDUP

ELECTRICAL: Reference Project drawings for electrical requirements.

WATER AND WASTE: Reference Project drawings for all requirements.

Description:

Dimensions: 68.5(h) x 44.75(w) x 31.25(d)

Conveyor Dishwasher, single tank with power scrapper; Drain Water Energy Recovery with factory-installed drain water tempering kit; (202) racks/hour, .45 gallon/rack, Complete Delime with Booster Guard, Touch Screen Controls with diagnostics, troubleshooting, and SmartConnect App, capless wash arms, NSF Pot & Pan mode, pumped rinse, insulated hinged doors, cULus, NSF, ENERGY STAR®, Free factory startup for installations within a 100 mile radius of a Hobart service office; installation beyond 100 miles will be charged at the quoted rate by the local Hobart service office

Accessories and Options to be included:

- 1 ea          Standard warranty - 1-Year parts, labor & travel time during normal working hours within the USA
- 1 ea          Model CL66DWR-HTE15K Electric tank heat 15kW
- 1 ea          Model CL66DWR-ELE0CD 480v/60/3-ph  
Single point connection standard (field convertible to dual point)
- 1 ea          Model CL66DWR-HGTSTD Standard Height 19.5"H x 22"W opening, fits full-sized sheet pan, horizontal
- 1 ea          Model CL66DWR-ERH18K With 18 kW Booster (default)
- 1 ea          Model CL66DWR-DIR0LR Left to Right operation
- 1 ea          NOTE: For water of 3-grains of hardness or more, Hobart suggests adding a water softener.
- 2 ea          Model VNTHD/E-ADJ E-series vent hood domestic (adjustable)
- 8 ea          Model DISHRAK-PEG20 Peg Rack
- 3 ea          Model DISHRAK-COM20 Combination Rack
- 3 ea          Model RACK-HOTEL Hotel Pan Rack, holds (2) 12" x 20" x 4" deep hotel / steam pans; fits standard height openings of CLEN units
- 3 ea          Model BUNPAN-RACK Rack, bun pan
- 3 ea          Model SHTPAN-RACK Rack, 6 sheet pan
- 1 ea          Model PRESREG-1/20BR 1/2" brass pressure regulator
- 2 ea          Model 1/2INSHK-ABSRBR Water Shock Absorber Kit (2 required - 1 each incoming hot and cold water lines)
- 1 ea          Model TBLLIM-CL Table limit switch for CL & CLEN series
- 1 ea          Model CURTAIN-KITSTD KIT CURT'N SPLASH Standard E-SERIES
- 1 ea          Model CL66EN-BASFETSTD Standard feet
- 1 ea          WS40 Water Softening System, 2,527 grains/lb capacity, 5 gallons regeneration volume, & salt alarm, holds 1 bag of salt
- 2 ea          BAGS OF SALT

INSTALLATION OF HOBART DISH MACHINE AND WATER SOFTENER

Description:

CL66 WITH ALL ACCESSORIES. EQUIPMENT TO BE DELIVERED, UNCRATE AND SET IN PLACE BY FOOD SERVICE DEALER AND HOBART SERVICE SHALL SUPPLY FINAL CONNECTIONS.

UTILITY CONNECT: Hobart Service will complete all final utility connections including electrical, water and drains. All properly sized utilities MUST BE located at the final connection with-in 4 feet of the point by the GENERAL CONTRACTOR.

SUPPLIES Electrical/Plumbing misc/supplies are to be included by Hobart Service including any vacuum breakers required by code.

DEMO: Demonstration of proper use and care by a factory authorized sales representative.

START UP: Start up and adjust dish machine by Hobart Service

WARRANTY: Warranty on the machine to be extended to 18 months from date of startup - Dish machine ONLY; this does not include any other accessory, only the dishmachine.

ITEM 81 PANT LEG DUCT  
MANUFACTURER: KALTHOFF  
MODEL: CUSTOM

QTY: 1

Description:

S/S Pant Leg Duct with Trim Collar for Dish Machines exceeding 66", 16/300 S/S

ITEM 82: CLEAN DISHTABLE  
MANUFACTURER: KALTHOFF  
MODEL: CUSTOM

QTY: 1

Description:

Clean Dishtable, straight design, 96"W, LEFT TO RIGHT operation, 14/300 stainless steel top, stainless steel H-frame legs, NSF

Accessories:

1. Tubular Undershelf, 1-5/8" dia. tubular stainless steel construction (priced per foot)
2. Bullet Foot, stainless steel
3. Sound Deadening
4. Removable undershelf

ITEM 83 AMBIENT TRAY DRYER  
MANUFACTURER: SAN-AIRE INDUSTRIES  
MODEL: PD-100-M

QTY: 1

ELECTRICAL: Reference Project drawings for electrical requirements.

UTILITIES REQUIRED:

ELECTRICAL: 120v/60/1, 4.33amps, 500w, cord with NEMA 5-15P

Description:

PowerDry™ Kitchenware Dryer, Electric, lighted on/off rocker switch, (2) 20" x 6" x 3/8" removable aluminum filter, 826 CFM blower, adjustable air distribution louver, stainless steel housing, UL, CUL, NSF

Accessories

1. Wall mounted bracket
2. Model FILTERX4 (SAN206) Filter Set, 6" x 20" x 3/8", washable, for PD-100M/100MCORR/100F, set of 4
3. Model RD-101 RapiDrain™ Kitchenware Drainer, stainless steel construction, 1" x 3/16" flat bar with openings for water flow, 3/8" round rod cross bars, 16 ga. formed ends, 1-1/2" 90° lip
4. Model RD-101-E RapiDrain™ Kitchenware Drainer Extension, stainless steel construction, 1" x 3/16" flat bar with openings for water flow, 3/8" round rod cross bars, 16 ga. formed ends

ITEM 84 SPARE NUMBER

ITEM 85 THREE COMPARTMENT SINK

QTY: 1

MANUFACTURER: KALTHOFF

MODEL: CUSTOM

Description:

Sink, 3-compartments, 20"W x 28" front-to-back x 14" deep bowls, raised rolled edge, (2) 36" drainboards, stainless steel H-frame legs & adjustable bullet feet, 14/300 stainless steel construction, NSF

Accessories:

1. Removable stainless steel shelves under drain boards
2. Lever Drain, twist handle, includes handle bracket, 2" drain (Provided and installed by Fabricator)
3. Sound Deadening

ITEM 86 FAUCET & PRE-RINSE W/ADD A FAUCET

QTY: 2

MANUFACTURER: FISHER

MODEL: SEE BELOW

Description:

1. Fisher Model 34460  
Pre-Rinse Unit, spring style, backsplash mount, 8" centers, 16" riser, 36" hose, 1.15 GPM Ultra-Spray™ PLUS spray valve with built-in spray handle clip & dish guard bumper, lever handles with color coded indexes, add-on faucet with 12" swing spout, includes wall bracket, 1/2" NPT male inlets, brass, ADA Compliant
2. Model 3253 Faucet, wall mount, 8" adjustable centers, 12" swing spout, lever handles with color coded indexes, 1/2" NPT female inlets, brass, ADA Compliant  
1 year warranty against defects in materials or workmanship, standard

ITEM 87 STAINLESS STEEL WALL PANELS (DISHROOM)

QTY: 2-LOT

MANUFACTURER: KALTHOFF

MODEL: CUSTOM

Description:

1. Provide and install Type 304, 18-8, 22 gauge stainless steel panels on walls as shown on drawings.
2. Attach panels to masonry partitions with mastic cement (liquid nail) and stainless steel fasteners appropriate for walltype.
3. Caulk around panel edges and butt joints with clear silicon sealant.
4. Reference drawing FS500.

ITEM 88 SAFETY LADDER

QTY: 1

MANUFACTURER: ULINE

MODEL: H-3834\*

Description:

Safety angel 50 degree incline with 4 each, 24" wide expanded metal steps, 450lb capacity; with 4" diameter casters, 2 swivel-spring loaded and 2 rigid.

Fabricators which are pre-approved for construction of stainless steel custom fabrication (serving line equipment excluded) are: Low Temp Manufacturing, Jonesboro, GA.; Titan Stainless, Pageland, SC and Advance Tabco.

ITEM 89-91 SPARE NUMBERS

ITEM 92 STAINLESS STEEL WALL CAP

QTY: 1

SEE FS500 FOR DETAILS

MANUFACTURE: KALTHOFF

MODEL: CUSTOM

Size: Size and shape as shown on drawings. Cap to be approximate length and width of CMU walls. Cap to be one piece all welded construction.

Description:

1. Cap to be constructed of 16 gauge stainless steel with 3" square turn down on all sides.
2. All corners to be fully welded, ground and polished.
3. Full perimeter #7 hi-lite finish around the top of the wall cap.
4. Cap to be one piece all welded construction.
5. Seal to wall with clear silicon sealant.

ITEM 93A-C SMART WALL SHELVING

QTY: 3-LOT

MANUFACTURER: METRO

MODEL: SEE BELOW

ITEM 93A SMART WALL SHELVING

QTY: 1-LOT

- 1 ea Metro Model WG2436K4 Dimensions: 36(w) x 24(d)  
SmartWall Wire Grid, 36" x 24", Metroseal Gray epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, NSF
- 1 kt Model SWGB2 Quick Ship - SmartWall Grid Mounting Bracket Kit for Direct Wall Mount; type 304 Stainless Steel, kit consists of (6) brackets to connect grid to the wall, (1) required per grid
- 1 ea Model PBA-GSDK4 Quick Ship - SmartWall Light-Duty Grid Shelf, 18-1/2"W x 9"D, Metroseal Gray epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, NSF
- 2 ea Model PGHK6K4 Quick Ship - SmartWall Prong Hook, 6", Metroseal Gray epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection
- 1 ea Model H210K4 Quick Ship - SmartWall Storage Basket, 17-3/8"W x 7-1/2"D x 5"H, Metroseal Gray epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, NSF
- 1 ea Model IWA-12K4 SmartWall Large Utensil Holder, 10-3/8"W x 10-1/2"D, Metroseal Gray epoxy-coated corrosion-resistant finish with Microban® antimicrobial protectionepoxy finish

All Items to be packaged together, separate from any other items and marked with the Item number

ITEM 93B SMART WALL SHELVING

QTY: 1-LOT

- 1 ea Metro Model WG2436K4 Dimensions: 36(w) x 24(d)  
SmartWall Wire Grid, 36" x 24", Metroseal Gray epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, NSF
- 1 kt Model SWGB2 Quick Ship - SmartWall Grid Mounting Bracket Kit for Direct Wall Mount; type 304 Stainless Steel, kit consists of (6) brackets to connect grid to the wall, (1) required per grid
- 3 ea Model PGHK6K4 Quick Ship - SmartWall Prong Hook, 6", Metroseal Gray epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection
- 1 ea Model H209K4 Quick Ship - SmartWall Storage Basket, 13-3/8"W x 5"D x 7"H, Metroseal Gray epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, NSF
- 1 ea Model IWA-12K4 SmartWall Large Utensil Holder, 10-3/8"W x 10-1/2"D, Metroseal Gray epoxy-coated corrosion-resistant finish with Microban® antimicrobial protectionepoxy finish
- 1 ea Model GBHHK4-S Glove Box Holder, horizontal, (1) box capacity, Metroseal 4 Gray
- 2 ea Model HK25C Quick Ship - SmartWall Snap-On Hook, 3-1/2"H, chrome, style B - large, multi-purpose

All Items to be packaged together, separate from any other items and marked with the Item number

ITEM 93C SMART WALL SHELVING

QTY: 1-LOT

Description:

Smart Wall G3 MetroSeal™ Gray

Provide the following 11'-0" Unit on Tall Wall:

1 ea SW40K4	Wall Track
2 ea SW56K4	Wall Track
6 ea SWU45K4	Uprights
6 ea SWS18K4	18" Shelf Supports
6 ea SWS14K4	14" Shelf Supports
2 ea WG1848K4	18" x 48" Grid
1 ea WG1836K4	18" x 36" Grid
2 ea1848NK4	18" x 48" Metroseal Shelves
1 ea1836NK4	18" x 36" Metroseal Shelves
2 ea 1448NK4	14" x 48" Metroseal Shelves
1 ea 1436NK4	14" x 36" Metroseal Shelves

Accessories:

8) HK26C	Double Hooks
18) PGHK6K4	Pronged Hooks
5) H210K4	Wire Basket
6) PBA-GSDK4	Light-Duty Shelf

All Items to be packaged together, separate from any other items and marked with the Item number  
Below is a sample layout for the accessories for this set up.



ITEM 94 SPARE NUMBER

ITEM 95 SS PICTURE FRAME FOR ITEM 50  
MANUFACTURER: KALTHOFF  
MODEL: CUSTOM

QTY: 1-LOT

Description:

Provide and install 22 gauge, Type 304, 18-8 stainless steel picture frame with 3" overlay on all sides on customer and operator sides to seal any gaps between units and wall cap. Corners must be welded and ground smooth. Trim is sealed to boxes with clear silicon caulking. Use clear silicon caulking described in this section under Installation. Purpose of trim and caulking is to provide a complete seal between the wall cap and boxes and to close crevices against dirt and vermin. Reference page FS-500 for detail.

ITEM 96 SS PICTURE FRAME FOR PASS THRU UNITS  
MANUFACTURER: KALTHOFF  
MODEL: CUSTOM

QTY: 1-LOT

Description:

Provide and install 22 gauge, Type 304, 18-8 stainless steel picture frame with 3" overlay on all sides on customer and operator sides to seal any gaps between units and wall cap. Corners must be welded and ground smooth. Trim is sealed to boxes with clear silicon caulking. Use clear silicon caulking described in this section under Installation. Purpose of trim and caulking is to provide a complete seal between the wall cap and boxes and to close crevices against dirt and vermin. Reference page FS-500 for details

ITEM 97: TWO DOOR REACH IN COOLER  
EXISTING TO BE RELOCATED BY FSC

QTY: 1 (EXISTING)

ITEM 98: FILL FAUCET WITH RECESSED BOX  
MANUFACTURER: KALTHOFF/T & S BRASS  
MODEL: CUSTOM/B-0312 (COLD WATER)

QTY: 1

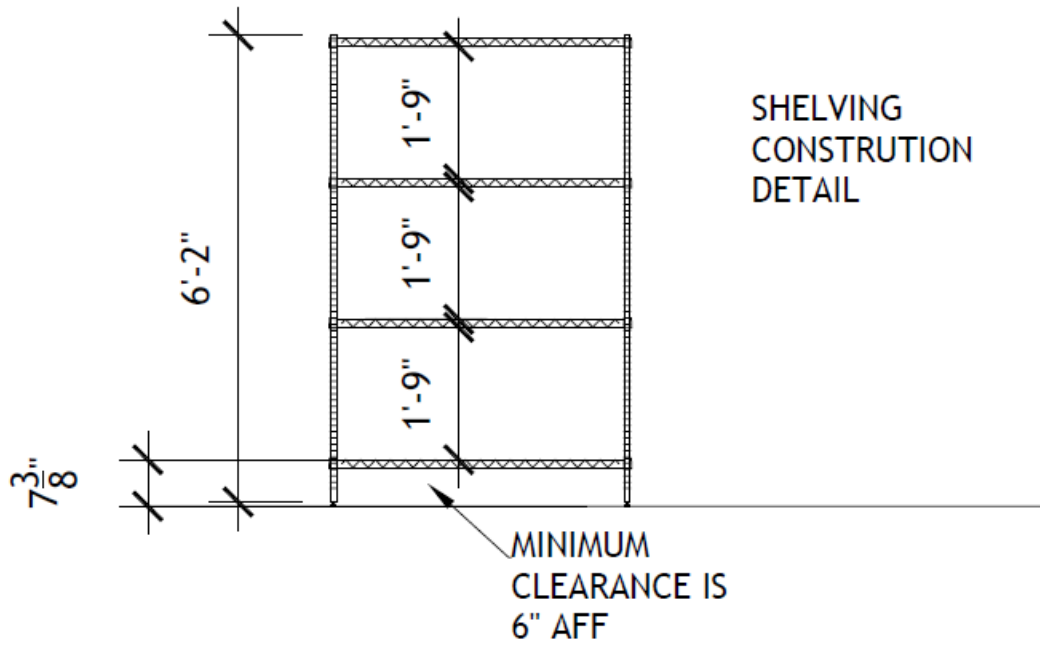
Description:

Single wall mounted faucet with swivel goose neck and handle on right. Faucet is located in finished recess in wall. Goose neck turned into wall when faucet is not in use.

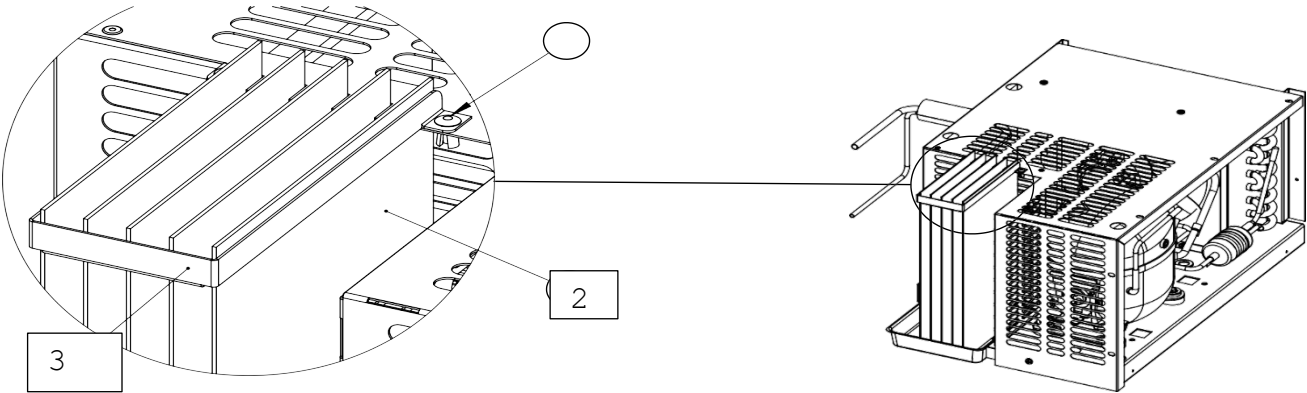
Supply ring adapter for garden hose connection by T & S Brass

Recess is lined with 22 gauge, type 304, 18-8 stainless steel box. Box is fully welded at all seams with cove corners and measures 15-3/4" x 15-3/4" x 5" deep. Box has 1 1/2" flange onto wall on four sides. Seal with clear silicon caulking at seams between flange and wall.

Coordinate with General Contractor. Include detail on rough-in drawings. Verify dimensions for recess.



DT01AS  
 WICKING PAD DETAIL-1 SECTION UNIT SHOWN



SER-60519-00			
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	000-98215-00	INSTALLATION INSTRUCTIONS (NOT SHOWN)	1

<b>2</b>	<b>341-60181-00</b>	<b>RIG-E-VAP CONDENSATE EVAPORATION PAD</b>	<b>5</b>
<b>3</b>	<b>701-61109-00</b>	<b>BRACKET EVAPORATION PADS</b>	<b>1</b>
<b>4</b>	<b>335-60012-00</b>	<b>RIVET,SNAP-IN</b>	<b>2</b>

**END OF SECTION 11 40 00**



PART 1 GENERAL

1.01 SCOPE

- A Projection screens.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 SUBMITTALS

- A Submit manufacturer's data on projection screens and accessories.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A Audio visual screens shall be by Da-Lite Screen Co. or equal of Draper Shade & Screen Company. Additional alternate manufacturers must be approved by Architect prior to bidding.

2.02 MATERIALS

- A Projection Screen Type 1: Large Cosmopolitan ® Electrol®, Ceiling-mounted electrically operated projection screens.
1. Screen Operation: Electrically operated, UL listed, retractable, heavy duty, with rigid metal roller.
  2. Motors:
    - a. Quantity: 1.
    - b. 120 V, 60 Hz, 3-wire with ground, permanently lubricated, quick reversal type designed for mounting inside roller.
    - c. Amperage: 2.4 amps maximum.
    - d. Include automatic thermal overload protection, integral gears, capacitor and electric brake to prevent coasting.
    - e. Include preset, adjustable limit switches to automatically stop fabric door and the viewing surface in UP or DOWN position.
    - f. Housing: Inside metal roller.
  3. Controls:
    - a. Electric Screen Control Switch: Wall mounted, 115 V, 60 Hz 3 position control switch.
    - b. Junction Box: Internally attached to the screen case.
  4. Screen Mounting: Ceiling chain hung, UL. Including mounting hardware.
  5. Screen Case: Designed to receive mounting hardware and sized to suit projection screen.
    - a. 2-piece extruded aluminum with panel
    - b. Finish Type: Black primer coat.
    - c. Case Length: 178 inches (452 cm).
  6. Screen Size:
    - a. Viewing Area: H 92 inches × W 164 inches (H 234× W 417 cm).
    - b. Format: HDTV - 1.0 to 1.78.
  7. Non-Tensioned Screen Material:
    - a. Front projection, flame retardant, mildew resistant fiberglass, black backing with standard black borders, easily cleaned with mild soap and water solution.
    - b. Bottom of fabric to form a pocket holding a metal rod.
    - c. Seams: Seamless
    - d. Gain: To SMPTE RP 94-2000, 2.8.
    - e. Viewing Angle: 30.

- B Type 2: Ceiling Recessed Electrically Operated Projection Screens.
1. Screen Operation: Electrically operated, UL and ULC listed, retractable, with 1 rigid metal roller.
  2. Motors:
    - a. Quantity: 1.
    - b. 120 V, 60 Hz, 3-wire with ground, permanently lubricated, quick reversal type designed for mounting inside roller.
    - c. Amperage: 2.4 amps maximum.
    - d. Include automatic thermal overload protection, integral gears, capacitor and electric brake to prevent coasting.
    - e. Include preset, adjustable limit switches to automatically stop fabric door and the viewing surface in UP or DOWN position.
    - f. Housing: Inside metal roller.
  3. Controls:
    - a. Electric Screen Control Switch: Wall mounted, 115 V, 60 Hz 3 position control switch.
    - b. Junction Box: Internally attached to the screen case.
  4. Screen Mounting: Ceiling recessed, UL. Include mounting hardware.
  5. Screen Case: Designed to receive mounting hardware and sized to suit projection screen.
    - a. Wood with metal-lined wiring compartment.
    - b. Finish Type: Black primer coat.
    - c. Case Bottom: Equipped with hinged automatic door for raising and lowering viewing surface and removable hinged door for manual access.
    - d. Finish: white doors.
    - e. Case Length: 97 1/2 inches 2,480 mm.
  6. Screen Size:
    - a. Viewing Area: H 45 inches × W 80 inches (H 114× W 203 cm).
    - b. Format: HDTV - 1.0 to 1.78.
  7. Non-Tensioned Screen Material equal to Boardroom Electrol Projection Screens:
    - a. Front projection, flame retardant, mildew resistant fiberglass, black backing with standard black borders, easily cleaned with mild soap and water solution.
    - b. Bottom of fabric to form a pocket holding a metal rod.
    - c. Seams: Seamless
    - d. Gain: To SMPTE RP 94-2000, 2.8.
    - e. Viewing Angle: 30.
- C Ceiling Mounted Manual Pull Down Screens shall be Model C
1. Screen Mounting: Ceiling recessed, UL. Include mounting hardware.
  2. Screen Case: Designed to receive mounting hardware and sized to suit projection screen.
    - a. Type 2: Wood with metal-lined wiring compartment.
    - b. Finish Type: Black primer coat.
    - c. Case Bottom: Equipped with hinged automatic door for raising and lowering viewing surface and removable hinged door for manual access.
    - d. Finish: white doors.
    - e. Case Length: 97 1/2 inches 2,480 mm.
  3. Screen Size:
    - a. Viewing Area: H 45 inches × W 80 inches (H 114× W 203 cm).
    - b. Format: HDTV - 1.0 to 1.78.
  4. Non-Tensioned Screen Material equal to Boardroom Electrol Projection Screens:
    - a. Front projection, flame retardant, mildew resistant fiberglass, black backing with standard black borders, easily cleaned with mild soap and water solution.
    - b. Bottom of fabric to form a pocket holding a metal rod.
    - c. Seams: Seamless
    - d. Gain: To SMPTE RP 94-2000, 2.8.
    - e. Viewing Angle: 30.

2.03 ACCESSORIES

- A Screen Drop: Extra drop of 2 inches in black fabric at top, not to exceed 13 feet (4 m) maximum total surface height including picture area.
- B Silent Motor for sizes up to 9 feet × 12 feet (2.7 × 3.7 m).

PART 3 EXECUTION

3.01 INSTALLERS

- A. Provide experienced and qualified technicians to install electrically operated projection screens.

3.02 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions and Da-Lite Screen Company, Inc., technical data sheets.

3.03 EXAMINATION

- A. Verify that conditions of substrates previously installed under other sections or contracts are acceptable with electrically operated projection screen installation.
- B. Verify type and location of power supply. Ensure electrical power supply is installed to meet electric projection screen requirements
- C. Proceed with installation only after unacceptable conditions have been corrected.
- D. Install viewing surface and drive assembly in housing only after interior construction is substantially complete.

3.04 COORDINATION

- A. Coordinate electric projection screen placement with other ceiling and wall mounted components.

3.05 INSTALLATION

- A. Install electric projection screens in accordance with reviewed shop drawings at locations and heights indicated.
- E. Install screen housing and make electrical connections in conjunction with installation of suspended ceiling system.
- F. Screen fabric to be permanently attached to roller.
- G. Securely install screens plumb and level to supporting substrate.

3.05 FIELD QUALITY CONTROL

- A. Testing and Inspection: Operate each screen 3 times to ensure viewing surfaces extend and retract through full range of motion.
  - 1. Verify controls, limit switches, automatic doors and other components function as designed and meet project requirements.
  - 2. Ensure viewing surface raising operation fully engages and lifts screen closure door into closed position.
  - 3. Adjust motors, controls and components to allow for smooth, unobstructed screen operation.

3.06 FINAL CLEANING

- A. Upon completion, remove surplus materials, rubbish, tools and equipment.

3.07 PROTECTION

- A. Protect electrically operated projection screens from damage during construction.
- B. Repair damage to adjacent materials caused by electrically operated projection screen work.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

- A Furnish all labor, materials, equipment, and supervision necessary to provide television brackets as shown on the drawings and as specified herein.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 SUBMITTALS

- A Submit manufacturer's data and installation detail for approval before installation.

1.04 QUALITY ASSURANCE

- A Television brackets shall have a warranty of five (5) years from date of installation to be free of defects of material and workmanship. Construction shall be from heavy gauge steel with arc welding. Mount shall be load rated for 125 pounds.

PART 2 PRODUCTS

2.01 MATERIALS

- A Television bracket shall be similar and equal to Model FPSM-W-O-AL for up to 32 inch flat panel television as manufactured by Bretford Manufacturing Inc., Shiller Park, Illinois.
- B Mount shall have 45° left/right positioning and 360° swivel portrait/landscape positioning capability. Mount shall be furnished with set screws to hold mount in desired position. Television shall be held in place with 4 inch stabilizing racket. Model shall include an interior plate pre-drilled for mounting to wall and a cover plate for finishing.

PART 3 EXECUTION

3.01 INSPECTION

- A Installer shall inspect surfaces to receive mounts to determine the condition is in accordance with specifications where the structure is such that it will sustain the securing fasteners and weight of the mount and television.

3.02 INSTALLATION

- A Install wall bracket in accordance with manufacturer's instructions.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Stage curtain fabrics.
- B. Linings.
- C. Stage curtain track support systems.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 33.13 - Conduit for Electrical Systems: Conduit from electric circuit to operator and from operator to control station.
- B. Section 26 05 83 - Wiring Connections: Power to disconnect.

1.03 REFERENCE STANDARDS

- A. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2018.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM A391/A391M - Standard Specification for Grade 80 Alloy Steel Chain; 2007 (Reapproved 2012).
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.
- E. FM (AG) - FM Approval Guide; current edition.
- F. ITS (DIR) - Directory of Listed Products; current edition.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; 2019.
- I. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide for each type of product as follows:
  - 1. Stage Curtains: Provide information on type of curtain, weight, location for use on project, and type of flame retardancy.
  - 2. Draw-Curtain and Fly-Curtain Operators: Provide rated capacities, and operating and electrical characteristics.
  - 3. Tracks: Provide capacity of each curtain track to support curtain weight and control curtain operation.
- C. Shop Drawings: Indicate installation information for components not dimensioned or detailed in product data.
  - 1. Submit floor plans, elevations, sections, attachment details of curtains and operating clearances.
  - 2. Submit fabric assembly and support details.
  - 3. Submit documentation indicating load capacity of each batten, track, attachment, and rigging components.
  - 4. Submit attachment locations for grand drape, backdrop curtain, and proscenium curtain, and corresponding loads imposed on structure.
  - 5. Submit locations of equipment components, switches, and controls; identify between manufacturer installed and field installed wiring.
  - 6. Submit wiring diagrams for power, signal, and control wiring.

- D. Verification Samples: Submit fabric full width by at least 12 inch long section of each selected fabric from dye lot to be used for this work, with specified treatments applied and showing repeat of patterns; mark top and face of fabric.
- E. Certificate: Certify that products of this section meet or exceed specified requirements.
- F. Manufacturer's Qualification Statement.
- G. Installer's Qualification Statement.
- H. Operation and Maintenance Data: For stage curtains and rigging operations.
- I. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project:
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.

#### 1.06 QUALITY ASSURANCE

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

#### 1.07 FIELD CONDITIONS

- A. Ambient Conditions: Do not install stage curtains until spaces are fully enclosed and watertight, and the following:
  - 1. Wet work in adjacent areas is complete and surfaces are dry.
  - 2. Work at and above ceiling level has been completed.
  - 3. Ambient temperatures and humidity of adjacent areas are maintained at levels when occupied for intended use.
- B. Field Measurements: Confirm supporting structural element locations and adjacent construction for stage curtains and rigging, and complete field measurements prior to fabrication and include these dimensions on shop drawings.

#### 1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a two year period after Date of Substantial Completion.
  - 1. Defective Work includes, but is not limited to, stage curtain support and rigging that is not operating properly.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Basis of Design:
  - 1. Stagecraft: [www.stagecraftindustries.com](http://www.stagecraftindustries.com).
  - 2. Substitutions: 01 25 00 - Substitution Procedures.

#### 2.02 PERFORMANCE REQUIREMENTS

- A. Stage Curtain Systems Design: Engage qualified designer to develop design of stage curtain system, including comprehensive project specific analysis of necessary structural system attachments in compliance with performance requirements.
- B. Structural Performance: Ensure attachment of stage curtain system to structure withstands material weight and operational loads applicable for this project and in compliance with local building codes and authorities having jurisdiction.
  - 1. Design Loads: Weight of stage curtains and track system.

- C. Fire-Test Characteristics: Stage curtain fabrics in compliance with NFPA 701 flame propagation fire test requirements conducted by authorized testing agency, listed by UL (DIR), ITS (DIR), or FM (AG) and acceptable to authorities having jurisdiction.
  - 1. Permanently attach label to fabric of each curtain assembly indicating fabric treatment as follows:
    - a. Inherently Flame Retardant (IFR), fibers/yarns that are non-combustible for life of fabric.
    - b. Durable Flame Retardant (DFR), fibers/yarns that are non-combustible for life of fabric.
    - c. Flame Retardant (FR), fabric has been topically treated in an immersion process with chemical fire retardant.
      - 1) Indicate retreatment requirements after cleaning or after designated period of time.
  - 2. Permanently attach swatch of matching fabric from same dye lot, at least 12 inch square, to backside of curtain assembly for use as fire-resistance test strip.
- D. Electrical Components: Devices that are listed and labeled in compliance with NFPA 70, by a qualified testing agency, and marked for designated application.

#### 2.03 STAGE CURTAIN FABRICS

- A. Provide curtains of matching fabric and color from single dye lot, and when size and quantity of curtains exceeds maximum dye lot size, provide curtain or adjacent pair of curtains from only one dye lot, and arrange curtain dye lots to minimize exposure of any differences.
- B. Type A - Polyester Velour: Weighing at least 25 ounces/linear yard, napped fabric of 100 percent polyester with minimum pile height of 75 mils, 0.075 inch and minimum width of 54 inch.
  - 1. Application: Main Traveler, Main Valance, Olivo Traveler, Olivo Legs, Olivo Valance, Cyclorama Traveler, Cyclorama Legs, and Cyclorama Border.
  - 2. Color: As selected by Architect from manufacturer's full range.
  - 3. Texture: As selected by Architect from manufacturer's full range.
  - 4. Pattern: As selected by Architect from manufacturer's full range.

#### 2.04 LININGS

- A. Type LA - Light-Weight Polyester Lining: Weighing at least 10 ounces/linear yard, 100 percent polyester fabric; 72 inch minimum width.
  - 1. Color: Match curtain color.

#### 2.05 CURTAIN TRACK

- A. Steel Track: Commercial quality, roll-formed, galvanized steel sheet, ASTM A653/A653M, with G60 coating designation; with continuous bottom slot and each half of track in single continuous piece; black paint finish; including support and operation accessories.
  - 1. Thickness: As recommended by manufacturer for curtain loads and operation.
    - a. Heavy-Duty: 14 gauge, 0.0747 inch minimum thickness.
- B. Curved Track: Shop fabricate curved portions of curtain track.
  - 1. Curved Track Cable Guides: Provide outside idlers, mule pulleys, spindles, and guides as required for curve configuration and track length.
- C. Curtain Rails: Provide single or double curtain capacity as indicated on drawings, and end stops.
- D. Curved-Suspended-Track Stiffener: Steel pipe, 1-1/2 inch nominal diameter, Grade A, Schedule 40 in accordance with ASTM A53/A53M; support both sections of curved suspended tracks, with curve to match track.
- E. Clamp and Bracket Hangers: Steel clamps and brackets of required strength to support loads for attaching track to overhead support.
- F. Track-Lap Clamp: Clamp that matches track channel finish as necessary for attaching two tracks at center overlap.
- G. Folding Guide: Carriers, as indicated on drawings, with rear-fold or backpack guide and rubber spacers to fold curtain from offstage end of curtain; size for use with operating line as required.

- H. Operation:
  - 1. Manual Walk-Along Operation: Curtain track without a cord, cable, pulleys, or floor pulley; must walk with curtain to open and close.
- I. Track System: Provide heavy-duty curtain track with components as recommended by manufacturer for loads and operation, including track end stops.
  - 1. Carriers: Standard plated-steel carriers with a pair of nylon tired ball-bearing wheels riveted parallel to body, and equip carriers with rubber or neoprene bumpers to reduce noise and plated-steel swivel eye and trim chain for attaching curtain snap or S-hook, and required number of curtain carriers for track length and curtain fabrication.
    - a. Master Curtain Carriers: One plated-steel master carrier for each leading curtain edge, with two pairs of nylon tired ball-bearing wheels and with two line guides per carrier.
  - 2. Pulleys: One dead-end, single-wheel pulley; one live-end, double-wheel pulley; and one adjustable pulley to maintain proper tension on operating line; each with molded-nylon-tired ball-bearing sheaves enclosed in steel housings; pulleys with steel housing finished to match track and with bracket for securing off-stage end of curtain.

## 2.06 FABRICATION - CURTAINS

- A. General: Provide vertical seams unless otherwise indicated, locate vertical seams so they do not fall on faces of pleats, and only use fabric that is cut greater than half the width of fabric.
  - 1. Facing the full width of material at center meeting edges.
  - 2. Curtains that are tabled square, and hems that don't pucker.
  - 3. 1-1/2 inch clearance from floor at bottom of curtain.
  - 4. Curtains are 24 inch longer than clear height of valance opening.
  - 5. Curtains that overlap 36 inch at the center.
  - 6. Curtains that extend 24 inch on each side beyond full width of proscenium opening.
- B. Vertical and Top Hems: Machine sew hems as follows, unless otherwise indicated:
  - 1. Vertical Hems: Fabricate at least 2 inch wide, and at least 4 inch wide at borders, valances, teasers, and tormentors with at least 1 inch tuck and without visible selvedge material from front of curtain; sew open ends of hems closed.
  - 2. Turnbacks: Fabricate leading-edge and trailing-edge turnbacks for traveler curtains by folding back at least 12 inch of face fabric, with at least 1 inch tuck, and vertically secured by sewing.
  - 3. Top Hems: Fabricate by double-stitching 3-1/2 inch wide, heavy jute or laminated synthetic webbing to top edge at back side of curtain with at least 2 inch of face fabric turned under.
- C. Fullness:
  - 1. Flat: Zero percent fullness in curtains.
  - 2. 50 Percent Fullness: Provide this fullness, exclusive of turnbacks and hems, and spaced at 12 inch on center along top hem reinforcement as follows:
    - a. Sewing additional material into 3 inch double-stitched, flat, box pleats.
- D. Bottom Hems: Machine sew hems as follows, unless otherwise indicated:
  - 1. For Curtains With Fullness:
    - a. Curtains That Don't Hang to Floor: Hems at least 3 inch deep, with weight tape, 3/4 inch, and open ends of hems sewn closed.
  - 2. Lining: Provide lining for curtain with matching fullness of face fabric and finished 2 inch shorter than face fabric, and sew or otherwise securely fasten lining to top hem of face fabric.
    - a. Attach lining to face fabric along bottom and side seams with 4 inch long strips of heavy woven cotton tape.
    - b. Sew lining to bottom edge of curtain to provide sufficient lining fabric for tucking and to accommodate for shrinkage.

## 2.07 ACCESSORIES

- A. S-Hooks: Manufacturer's standard heavy-duty plated wire hooks, at least 2 inch long.
- B. Battens: Fabricate using steel pipe and minimize the number of joints; connect pipe at joints using 18 inch long internal splice sleeve secured with four flush rivets, plug welds, threaded couplings, or equally strong method.

1. Steel Pipe: 1-1/4 inch nominal diameter, Grade A, Schedule 40 in accordance with ASTM A53/A53M.
  2. Finish: Matte black with 1 inch wide yellow colored stripe along center of each batten.
- C. Support, Clamps, and Anchors: Galvanized after fabrication sheet steel, Class B in accordance with ASTM A153/A153M; manufacturer's standard thickness.
- D. Trim and Support Chain: Hardened alloy steel chain rated for overhead lifting, Grade 80 in accordance with ASTM A391/A391M.
- E. Inserts, Bolts, Rivets, and Fasteners: Manufacturer's standard and corrosion-resistant.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Examine areas and conditions, with installer present, for compliance with requirements for supporting structural members, blocking, clearances, installation tolerances, and other conditions that may impact performance of stage curtain assembly.
- B. Examine placement and condition of inserts, clips, blocking, or other supports installed by others and for use in supporting track and battens of stage curtain assembly.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.02 INSTALLATION, GENERAL

- A. Install stage curtain assembly in accordance with curtain and track manufacturers written instructions.

#### 3.03 INSTALLATION - CURTAIN

- A. Track Hung: Secure curtains to track carriers with S-hooks.
- B. Batten Hung: Secure curtains to pipe battens with S-hooks.

#### 3.04 INSTALLATION - BATTENS

- A. Install battens by suspending at heights as indicated with trim and supports spaced as required to support loads; do not exceed 10 feet between supports.
  1. Chain Support: Secure chain as required for application with load-rated terminations.

#### 3.05 INSTALLATION - TRACK

- A. Mounting of Track Assembly:
  1. Beam Mounted: Install track by suspending from beam clamps securely mounted to structural I-beam and within intervals indicated in manufacturer's written instructions for on center spacing.
- B. Track Support Spacing: Comply with manufacturer's recommendations for applied loads, and not to exceed the following dimensions between track supports:
  1. Heavy-Duty Track: 6 feet, maximum.
- C. Install track for center-parting curtains with at least 24 inch overlap of track sections at center-line, and supported with track lap clamps.

#### 3.06 CLOSEOUT ACTIVITIES

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.
- B. Demonstrate proper operation of equipment to Owner's designated representative.
- C. Demonstration: Demonstrate operation of system to Owner's personnel.
  1. Use operation and maintenance data as reference during demonstration.
  2. Briefly describe function, operation, and maintenance of each component.
- D. Training: Train Owner's personnel on operation and maintenance of system.
  1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.

2. Provide minimum of two hours of training.
3. Instructor: Manufacturer's training personnel.
4. Location: At project site.

3.07 PROTECTION

- A. Protect installed stage curtain assembly from subsequent construction operations until Date of Substantial Completion.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Basketball backboards, goals, and support framing.
- B. Floor sleeves for net and goal posts.
- C. Wall padding.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete floor slab to receive floor sleeves and anchors.
- B. Section 05 12 00 - Structural Steel Framing: Structural members supporting basketball systems.
- C. Section 05 50 00 - Metal Fabrications: Secondary structural members supporting gymnasium equipment.
- D. Section 09 62 00 - Resilient Athletic Flooring: Gymnasium flooring.
- E. Section 26 05 83 - Wiring Connections.

1.03 REFERENCE STANDARDS

- A. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Large Components: Ensure that large components can be moved into final position without damage to other construction.
- B. Electrically Operated Equipment: Coordinate location and electrical characteristics of service connection.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data showing configuration, sizes, materials, finishes, hardware, and accessories; include:
  - 1. Electrical characteristics and connection locations.
  - 2. Fire rating certifications.
  - 3. Structural steel welder certifications.
  - 4. Manufacturer's installation instructions.
- C. Erection Drawings: Detailed dimensional requirements for proper location of equipment.
- D. Operating and maintenance data, for each operating equipment item.
- E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified with minimum five years of experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to project site in manufacturer's original packaging with factory original labels attached.
- B. Store products indoors and elevated above floor; prevent warping, twisting, or sagging.

- C. Store products in accordance with manufacturer's instructions; protect from extremes of weather, temperature, moisture, and other damage.

1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Gymnasium Equipment:
  - 1. IPI by Bison, Inc: [www.ipibybison.com](http://www.ipibybison.com).
  - 2. Porter Athletic Equipment Company: [www.porterathletic.com](http://www.porterathletic.com).
  - 3. Substitutions: 01 25 00 - Substitution Procedures.

2.02 GENERAL REQUIREMENTS

- A. See drawings for sizes and locations, unless noted otherwise.
- B. Where mounting dimensions or sizes are not indicated, comply with applicable requirements of the following:
  - 1. National Federation of State High School Associations (NFHS) sports rules.
  - 2. United States Olympic association rules for the sport.
- C. Provide mounting plates, brackets, and anchors of sufficient size and strength to securely attach equipment to building structure; comply with requirements of contract documents.
- D. Hardware: Heavy duty steel hardware, as recommended by manufacturer.
- E. Electrical Wiring and Components: Comply with NFPA 70; provide UL-listed equipment.
- F. Structural Steel Fabrications: Welded in accordance with AWS D1.1/D1.1M, using certified welders.

2.03 BASKETBALL

- A. Basketball System: Backstop assembly, backboard, and goal.
  - 1. Manufacturers:
    - a. Draper, Inc: [www.draperinc.com](http://www.draperinc.com).
    - b. IPI by Bison, Inc: [www.ipibybison.com](http://www.ipibybison.com).
    - c. Substitutions: 01 25 00 - Substitution Procedures.
- B. Ceiling-Suspended Backstop Assemblies: Capable of mounting both rectangular and fan-shaped backboards.
  - 1. Framing: Center strut; forward folding framing.
  - 2. Folding Control System: Electric hoist that folds backstop with 115 volt actuator, integral limit switches that provide automatic shut-off in both positions, and safety catch with automatic reset.
  - 3. Framing Color: Flat black.
  - 4. Manufacturers:
    - a. Draper, Inc; EZ Fold Ceiling Suspended Forward-Folding: [www.draperinc.com](http://www.draperinc.com).
    - b. IPI by Bison, Inc; IP1360FF Forward Fold, Front Braced: [www.ipibybison.com](http://www.ipibybison.com).
    - c. Substitutions: 01 25 00 - Substitution Procedures.
- C. Backboards: Tempered glass, rectangular shaped.
  - 1. Frame: Brushed aluminum edge, steel mounting.
  - 2. Markings: Painted.
  - 3. Provide safety padding for bottom edge of backboard.
  - 4. Provide mounting kit.
  - 5. Color: As selected from manufacturer's standard selection.
  - 6. Manufacturers:
    - a. Porter Athletic Equipment.
    - b. Substitutions: 01 25 00 - Substitution Procedures.
- D. Goals: Steel rim, mounted to backboard, with attached nylon net; complete with mounting hardware.
  - 1. Net Attachment Device: Tube-tie.

2. Breakaway mechanism, adjustable.
3. Finish: Powder coat orange.
4. Manufacturers:
  - a. Porter Athletic Equipment.
  - b. Substitutions: 01 25 00 - Substitution Procedures.

#### 2.04 FLOOR-MOUNTED EQUIPMENT

- A. Floor Sleeves for Posts: Metal sleeve, with latch cover, cast into concrete subfloor to hold poles for nets and goals; installed flush with finish floor surface.
  1. Latch Cover: Brass, round; tamper resistant lock with key.
  2. Sleeve: Aluminum.
  3. Depth of Sleeve: 9 inches from floor surface to bottom, including latch cover.

#### 2.05 WALL PADDING

- A. Basis of Design Manufacturer: Decker Equipment; Vinyl Gym Wall Padding: [www.schoolfix.com](http://www.schoolfix.com).
  1. Size of each pad: 24 inches x 60 inches.
  2. Layout: See drawing interior elevations.
  3. Color: Manufacturer's standard Blue.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Take field measurements to ensure proper fitting of work. If taking field measurements before fabrication will delay work, allow for adjustments within recommended tolerances.
- B. Inspect areas and conditions before installation, and notify MBI Companies in writing of unsatisfactory or detrimental conditions.
- C. Do not proceed with this work until conditions have been corrected; commencing installation constitutes acceptance of work site conditions.
- D. Verify that electrical services are correctly located and have proper characteristics.

#### 3.02 INSTALLATION

- A. Install in accordance with contract documents and manufacturer's instructions.
- B. Coordinate installation of inserts and anchors that must be built in to flooring or subflooring.
- C. Install equipment rigid, straight, plumb, and level.
- D. Secure equipment with manufacturer's recommended anchoring devices.
- E. Separate dissimilar metals to prevent electrolytic corrosion.

#### 3.03 ADJUSTING

- A. Verify proper placement of equipment.
- B. Verify proper placement of equipment anchors and sleeves, and use actual movable equipment to be anchored if available.
- C. Adjust operating equipment for proper operation; remove and replace equipment causing noise or vibration; lubricate equipment as recommended by manufacturer.

#### 3.04 CLEANING

- A. Remove masking or protective covering from finished surfaces.
- B. Clean equipment in accordance with manufacturer's recommendations.

3.05 PROTECTION

- A. Protect installed products until Date of Substantial Completion.
- B. Replace damaged products before Date of Substantial Completion.

END OF SECTION

## PART 1 GENERAL

### 1.01 SUMMARY

- A. Furnish all labor, materials, equipment, and supervision necessary to provide and install laboratory casework systems including the following:

1. Wood Laboratory Casework
2. Countertops
3. Shelving
4. Plumbing Fixtures
5. Electrical Fixtures

- B. Additional work to be performed by Contractor:

1. Final installation of all plumbing, service and electrical fixtures attached to casework or countertop (excluding piping and wiring within fume hoods).
2. Final connection to service lines of all plumbing, service and electrical fixtures attached to laboratory casework or furniture.

### 1.02 RELATED SECTIONS

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

### 1.03 REFERENCES

- A. AWI: Quality Standards, Eighth Edition
- B. SEFA (Science Equipment and Furniture Association) 8: Laboratory Furniture – Casework, Shelving and Tables Guidelines
- C. HPVA: Hardwood Plywood Veneer Association
- D. ISO (International Standards Organization) 9001:2000 – Quality Management
- E. Forest Stewardship Council
- F. ADA (ATBCB ADAAG) Americans with Disabilities Act Accessibility Guidelines
- G. ANSI
- H. NFPA 30 & 45
- I. QCP

### 1.04 SYSTEM DESCRIPTION

- A. Cabinet and Casework Area Design:

1. Full flush overlay type cabinets shall consist of hinges mortised into doors producing 1/8" reveal between intra-cabinet members and 1/16" reveal from cabinet front to cabinet side to provide a 1/8" reveal throughout.
2. Veneer grain on door and drawer fronts are to be matched vertically per door/drawer set.
3. Veneer species shall be grade 'A' maple.
4. Veneer cut shall be plain sliced.
5. Veneers shall be Slip Matched.

6. Doors and drawer fronts are to be slightly eased at all edges.
7. Cabinet elevations will be built in symmetrical sizes as required to fill the area.
8. Exposed veneer includes wood surfaces that are in plain sight when all cabinet doors and drawers are closed. In cases of no doors or drawers, or glass doors the line of plain sight is above 37" from the floor and below 72" from the floor.

#### 1.05 SUBMITTALS

##### A. Product Data:

1. Drawings shall include data and details for construction of the laboratory casework as well as information regarding the name, quantity, type and construction of materials (such as hardware, etc.), that will be used to complete the project.

##### B. Shop Drawings:

1. The laboratory casework manufacturer shall furnish shop drawings illustrating the layout and placement of all laboratory casework and fume hoods as well as any products included in this section.
2. Indicate the type and location of all service fittings and associated supply connections.
3. Preparation instructions and recommendations.
4. Storage and handling requirements and recommendations.
5. Installation methods.

##### C. Selection Samples:

1. Stain color to match existing.
2. One unit of each type of exposed hardware.
3. One (1) 24" wide, full-height base cabinet: Construction to consist of one (1) drawer, one (1) door, one (1) cupboard with adjustable full depth shelf and related hardware (pulls, hinges, drawer slides, etc.), complete with finish.
4. One 36" wide x 36" high wall cabinet: Construction to consist of two adjustable shelves as well as related hardware and doors, complete with finish.
5. One complete set of stain chips representing the manufacturer's full range of available colors. Minimum sample size 2 inches by 3 inches.

##### D. Quality Assurance/Control

1. Design Data/Test Reports: Manufacturer shall submit test data and design criteria which are in compliance with the project specifications.
2. Certificates: All certifications required in the specifications shall be submitted with the original submittal package under separate cover. Certificates must be provided with the signature of a qualified individual of the supplier.
3. Manufacturers' Instructions: Provide manufacturer's instructions for installation and maintenance of all products provided and installed within this section.

#### 1.06 QUALITY ASSURANCE

##### A. Mock-Ups

1. Area mockups shall be as indicated on the shop drawings. Post bid mockup areas must be priced for disassembly and reassembly and used within the project.
2. Do not proceed with remaining work until installation is approved by Architect.
  - a. Base cabinets installed with specified hardware.
  - b. Wall cabinets installed with specified hardware.

- c. Workstations installed.
- d. Fume hoods installed.

1.07 DELIVERY, STORAGE AND HANDLING

A. Packaging, Shipping, Handling and Unloading

- 1. Packaging: Products shall have packaging adequate enough to protect finished surfaces from soiling or damage during shipping, delivery and installation.
- 2. Delivery: Casework delivery shall only take place after painting, utility rough-ins and related activities are completed that could otherwise damage, soil or deteriorate casework in installation areas.
- 3. Handling: Care, such as the use of proper moving equipment, experienced movers, etc., shall be used at all times to avoid damaging the casework. Until installation takes place, any wrapping, insulation or other method of protection applied to products from the factory will be left in place to avoid accidental damage.

B. Acceptance at Site: Casework will not be delivered or installed until the conditions specified under Part 3, Installation section of this document have been met. Products delivered to sites that are not enclosed and/or improperly conditioned will not be warranted against warping or damage due to unsatisfactory conditions.

C. Storage: Casework shall be stored in the area of installation. If, prior to installation, it is necessary for casework to be temporarily stored in an area other than the installation area, the environmental conditions shall meet the environmental requirements specified under the Project Site Conditions article of this section.

D. Waste Management and Disposal: The supplier of the laboratory casework is responsible for removing any waste or refuse resulting from the installation of, or work pertaining to laboratory casework; thereby leaving the project site clean and free of debris. Trash container(s) to be provided by others.

1.08 WARRANTY

A. Furnish a written warranty that Work performed under this Section shall remain free from defects as to materials and workmanship for a period of one (1) year from date of shipment. Defects in materials and workmanship that may develop within this time are to be replaced without cost or expense to the Owner.

Defects include, but are not limited to:

- 1. Ruptured, cracked, or stained coating
- 2. Discoloration or lack of finish integrity
- 3. Cracking or peeling of finish
- 4. Slippage, shift, or failure of attachment to wall, floor, or ceiling
- 5. Structural failure
- 6. Warping or unloaded deflection of components
- 7. Failure of hardware

PART 2 – PRODUCTS

2.01 MANUFACTURER

A. Acceptable Manufacturers:

- 1. Mott Manufacturing LLC
- 2. Kewaunee Scientific
- 3. Campbell Rhea (ICI Scientific)

- B. No additional alternate manufacturers will be accepted.

2.02 MATERIALS

A. Solid Lumber for Laboratory Casework:

1. All hardwoods shall be carefully and thoroughly air-dried, and then kiln dried to a moisture content of 6 percent before use. This moisture content shall be maintained throughout production.
2. All front exterior wood casework surfaces exposed to view after installation, shall be plain sliced maple grade 'A'.
3. All door interiors, exposed exterior ends, tops and bottoms of open cases or cases having glazed doors; shall be plain sliced maple grade 'A'.
4. Some interior parts fabricated of hardwood shall be plain sliced maple species grade 'B'.

B. Exposed Veneer:

1. The veneer shall be specifically hand selected prior to fabrication of the cabinet faces and exposed components for uniformity of color and grain. The resulting selection shall provide a pleasing uniform color with natural characteristics selected to not interfere with the overall aesthetic appearance of the casework.
2. Veneer used for exterior surfaces exposed to view after installation, and the exposed interior ends, tops and bottoms of open cases shall be constructed of Grade 'A' or comparable, plain sliced maple].
3. Deviations and clarifications of HPVA standards.
4. Color and matching. 100% heartwood, no sapwood for maple no sharp contrasts at veneer joints.
5. Manufacturing characteristics. Rough cut or ruptured grain is not allowed.
6. All Door and drawer fronts will be vertically grain matched per door/drawer sets except where combination matched has been specified.

C. Semi-Exposed Veneer:

1. Veneer faces used for semi-exposed areas shall be constructed of plain sliced maple grade B.
2. Interior shelves shall be edge banded with 1/8 inch maple hardwood on front edge.

D. Plywood Core Construction for Casework Body and Interiors: All Plywood panels shall be constructed of minimum 3/4", 7-ply veneer core plywood. Plywood used for shelving over 36" shall be of minimum 9-ply 1" thick.

E. Tempered Hardboard: Wood-fiber and resin combination formed with heat and pressure into a hard, smooth surface.

F. Galvanized Sheet Steel: Commercial quality galvanized sheet steel to ASTM 653, Designation Z275.

G. Resilient Base and Adhesive: Top set coved, 3mm (1/8") thick, 150mm (6") high and 100mm (4") high as indicated for base units, including pre-molded stops and external corners or color selected by Consultant from full range. Continuous lengths. Adhesive for rubber base shall be trowelled on giving 100% coverage. Use an adhesive compatible with both surfaces, as recommended by the base manufacturer.

H. Glass:

1. Glass for framed doors shall be 1/8 inch Clear Laminated Safety.
2. Glass for unframed sliding glass doors shall be 1/4 inch, Clear Laminated Safety.

2.03 CABINET CONSTRUCTION

- A. Face Style: Full flush overlay door and drawer faces with 1/8" reveal vertically and horizontally between door and/or drawer faces. 1/16" between door and/or drawer faces and the end panel of a cabinet.
- B. Cabinet Ends: 3/4" Veneer core with 1/8" hardwood edge band of the same species as the cabinet face veneer.
- C. Support Rails: Top rail (front), and intermediate rails between drawers shall be panel product veneer core 1" thick by 4" doweled into cabinet side panels. Front rail shall be edge banded with 1/8" hardwood edge band. Back rails (top & bottom) shall be panel product veneer core 3/4" thick by 6-5/8" doweled into cabinet side panels.
- D. Security Panels: Shall be between all locking doors or drawers and vertically adjacent drawers when locks are specified as keyed differently.
- E. Toe Space Rail: 3/4" Veneer core fastened to the cabinet via dowels
- F. Cabinet Bottoms: 3/4" Veneer core with a 1/8" hardwood edge band set flush and attached to cabinet ends via dowels.
- G. Cabinet Backs: Fully removable 1/4" maple veneered plywood.
  - 1. Mandatory on cabinets with doors
  - 2. Sink cabinets to have a partial back to allow for plumbing.
- H. Vertical Dividers: Full height dividers and half height dividers shall be 3/4 inch material of same species and grade as cabinet body, secured to the bottom of the cabinet and top rails with dowels. Exposed edges shall be edge banded to match casework.
- I. Shelves: 1" Veneer core edge banded on cabinets with 32mm spacing to be set on twin pin plastic seismic shelf supports. Full depth shelves are standard and shall come to within 3/4" of the face of the cabinet in open units and within 3/4" to the inside face of cabinet doors.
- J. Drawer Body: Drawer sides to be constructed from 1/2" thick 9-ply Baltic Birch. Drawer sides shall be attached via dovetail joints at all four corners. Bottom shall be 1/4" maple veneered plywood and shall be captured in all four sides of the drawer body and glued completely around the bottom.
- K. Door and Drawer Fronts: 3/4" Combination core banded on all sides with same specie veneer edge banding.

2.04 WALL AND FLOOR CASES

- A. Case Ends: 3/4" Veneer core with 1/8" hardwood edge band of the same species as the cabinet face veneer
- B. Tops and Bottoms of Floor and Wall Cases: 1" Thick veneer core with 1/8" edge banding of same species as cabinet on front edges. Tops and bottoms are fastened to end panels via dowel pins.
- C. Backs: 1/4" Veneer core screwed in back panels
- D. Fixed Center Shelf on Floor Cases: 1" Veneer core with matching veneer edge banding on exposed edges on all open, hinged, and sliding door cabinets. Fixed center shelves fastened to ends via dowel pin construction.
- E. Shelves: 1" Veneer core edge banded on cabinets. Full depth shelves are standard and shall come to within 3/4" of the face of the cabinet in open units and within 3/4" to the inside face of cabinet doors.

F. Solid Doors:

1.  $\frac{3}{4}$ " Combination core banded on all sides with same specie veneer edge banding.
2. Provide two hinges on all doors up to 36" in height and a minimum of three hinges on any doors exceeding this height.

G. Framed Glazed Doors:

1. Hinged Doors:  $\frac{3}{4}$ " Solid lumber shaped to accept  $\frac{1}{8}$ " laminated safety glass on wall cabinets. Glass to be  $\frac{1}{4}$ " laminated safety on floor cabinets.
2. Provide two hinges on all doors up to 36" in height and a minimum of three hinges on any doors exceeding this height.
3. Sliding Doors: Provide doors that slide in top channels with a nylon wheel operating on an inset plastic track.
4. Hold glass in place with a removable plastic panel retainer to facilitate change of damaged glass.

H. Unframed Sliding Glass Doors

1. Unframed sliding doors to be  $\frac{1}{4}$ " Clear Laminated Safety glass with all edges ground, set in an extruded aluminum shoe with nylon wheel assemblies and top and bottom extruded aluminum track.
2. Provide silencer guides fitting on top of glass panel for smooth and noiseless operation.
3. Grind pull handles into sliding glass door.

2.05 HARDWARE

A. Pulls: Door and drawer pulls shall be brushed aluminum wire type mounted vertically on doors and horizontally on drawers. Two pulls shall be required on all drawers over 24 inches wide.

B. Hinges: Hinges shall be five (5) knuckle  $2\frac{3}{4}$  inch – 304 Stainless Steel for all hinged doors. Two hinges for doors less than 48 inches in height and three hinges on doors 48 inches or above in height.

C. Door Catches:

1. Roller Catches: Shall be used on all hinged doors. Catches shall have a spring-loaded polyethylene roller and are provided with a steel strike plate. Double doors without locks shall have a catch on each door. Tall cases shall have latching devices located on upper and lower part of each door. On cabinets equipped with locks, the left-hand door shall have a positive catch and the right hand door shall have roller type catch.
2. Elbow Catches: Catches and strike plates shall be used on left hand doors of double door cases where locks are used, and shall be steel, cadmium plated.

D. Locks: Locks shall be provided on casework drawers and hinged doors when indicated by the specified product number, shown on the drawings or called for in the casework schedule. Exposed surface of locks shall be dull chrome plated. All locks, for the purpose of coordinating keying systems, shall be five (5) disc tumbler type with removable cores. Locks are keyed individually unless otherwise specified to be furnished with master keys.

1. Framed Glass Doors: Locks shall be plunge type sliding showcase locks which are to be of the same type as those selected above.
2. Sliding Glass Doors: Locks shall be ratchet type sliding showcase locks which are to be of the same type as those selected above.

E. Drawer slides for standard drawers shall be grade '1' 100 lbs ball bearing full extension type.

- F. Shelf Support Clips: Plastic twin pin seismic type, for mounting on interior of cabinets. Clips shall be corrosion resistant and shall retain shelves from accidental removal. Shelves are adjustable on 1-1/4" centers.
- G. Mobile Cabinets: Provided with four caster wheels and brakes in lieu of the 4" toe kick. Cabinets with multiple drawers will automatically include a drawer interlock to prevent multiple drawers from being opened at once and therefore causing the cabinet to tip. Counterweights shall be installed to prevent drawers holding 50 lbs from tipping the cabinet.
  - 1. Tops and backs are to be enclosed and finished with same material and finish as cabinet enclosure.

## 2.06 TABLES

- A. Provide standard height table aprons of not less than 3/4" x 3-3/4" solid lumber machined to receive corner blocks and bolted to 2-1/8" x 2-1/8" solid hardwood legs. Drawers shall be constructed and finished as cabinet drawers as noted above.
- B. Provide all table legs with leveling devices and black plastic shoes unless otherwise specified. Shoes are to conceal leveling devices. Shoes shall be 4" high and constructed of plastic.

## 2.07 SPECIAL UNITS

### A. Acid Storage Base Cabinet:

- 1. Cabinet exterior is to match type of wood, stain, color and finish of adjacent cabinetry but is to be lined with a removable corrosion resistant material (molded polyethylene). Venting is to be accomplished through the use of a polyethylene vent hose through the back of the cabinet. If size permits, cabinet shall be equipped with one black phenolic shelf. Front edge of cabinet bottom shall have a 1" high raised sill to contain spills. Provide the door with a decal signifying "ACID" storage. On acid cabinets with two doors, provide one decal signifying "ACID" storage on each door.
- 2. Flammable Cabinet:
  - 1. UL1275 compliant: Flammable cabinets shall be listed and labeled as to having passed the testing requirements specified by Underwriters Laboratories.
  - 2. NFPA 30 compliant: Flammable cabinets shall be designed in such a way to meet or exceed the NFPA 30 standard.
  - 3. Cabinet Construction:
    - a. Cabinet end panels, top, bottom and back shall be 1" thick meeting the same veneer quality requirements as indicated in section 2.2 with 1/8" hardwood edge banding. The entire structure including end panels, top, bottom and back shall be of rabbet joint construction with each joint secured from two directions with countersunk screws affixed to hardwood blocking from the interior of the cabinet. The unit will be equipped with and a keyed astragal to seal the interior of the cabinet from the outside. All base units shall have a removable steel drip tray recessed within the blocking capable of retaining a 2" depth of spilled liquid.
    - b. Doors: Doors shall be fabricated using 1" solid plywood core. All four edges shall be edge banded with 1/8" hardwood. When the cabinet utilizes two doors the mutual joint shall consist of a rabbet overlap of not less than 1". Provide overlaid red warning decal 50mm (2") high on doors as follows: "FLAMMABLE -- KEEP FIRE AWAY".

4. Cabinet exterior: To match type of wood, stain, color and finish of adjacent cabinetry but is subject to the following differences:
  - a. Inset Overlay: Doors are set within the members of the frame to allow for the creation of a near airtight seal when closed. Reveals reflect panel width and are 1" around the entire face of the cabinet.  
Exposed Plywood: Properties pertaining to plywood used for exterior surfaces and doors remain consistent with the properties already specified under the Exposed Plywood section of Laboratory Casework.
  - b. Door Pull & Catch: Door pulls and catches shall be part of an integrated three point latching system that will remain functional in the event of fire exposure.
  - c. Hinges: Full-length piano style hinges are to be used that will not lose their load capability in the event of fire exposure.
  - d. Vents: Two 50mm (2") vents, complete with fire baffle covers on each vent, with 50mm (2") dia. fine metal filter shall be provided in the rear of the cabinet, one near the top of the cabinet and one near the bottom of the cabinet.

## 2.08 ACCESSORIES

### A. Task Lights:

1. Two each T5 4200k tubes
2. UL listed, includes diffuser
3. 100 fc at 18" and 40 fc at 30" from light to work surface in complete darkness.
4. Provide as indicated on drawings. If not indicated, provide at underside of each upper cabinet.
5. Lights shall be sized to meet specified lighting levels and shall also be 36" wide minimum

### B. Plumbing/Fixtures:

1. Rear upright structure to support a maximum of three plumbing fixtures.
2. Plumbing shall be arranged in such a fashion that they services cannot be intermixed.

### C. Needle Valves:

1. Provide valves with forged brass body, renewable self-centering floating stainless steel needle, renewable stainless steel seat and molded TFE stem packing with adjustable packing nut.
2. Valves shall have a removable outlet.
3. Valves shall be tested at 225 psig (1550 kPa) nitrogen pressure and shall be designed for working pressures up to 150 psig (1030 kPa).
4. Valves shall be certified to comply with ANSI Z 21.15/CGA 9.1.

## 2.09 FINISHES

### A. Flat Line Finish System

1. Finish must meet SEFA 8 requirements.
2. All exposed exterior and interior surfaces shall be finished with an environmentally friendly coating. The finish shall be applied to the wood under controlled conditions prior to the casework being assembled and attachment of hardware. The finish shall be fully UV cured to ensure proper performance.

### B. Chemical Resistance Performance

1. Test Method A: Test volatile chemical by placing a cotton ball saturated with reagent in the mouth of a 1-ounce bottle and inverting the bottle on the surface of the panel.

2. Test Method B: Test non-volatile chemicals by placing five drops of the reagent on the surface of the panel and covering with a 24 mm watch glass, convex side down.
3. Chemical Resistance for each reagent was rated as
  - a. Level 0= No detectable change
  - b. Level 1= Slight change in color or gloss
  - c. Level 2= Slight surface etching or severe staining
  - d. Level 3= Pitting, crate ring, swelling, or erosion of coating (obvious and significant deterioration).
  - e. N/A= No reagent in the lab
4. For a finish to pass, there should be no more than four level 3 results.
5. Test Results:

CHEMICAL SPOT TEST (SEFA 8-W)

Test No- Chemical	Test Method	Level
1. Amyl Acetate	A	0
2. Ethyl Acetate	A	0
3. Acetic Acid, 98%	A	0
4. Acetone	B	0
5. Acid Dichromate, 5%	A	0
6. Butyl Alcohol	A	0
7. Ethyl Alcohol	A	0
8. Methyl Alcohol	B	0
9. Ammonium Hydroxide, 28%	A	1
10. Benzene	A	0
11. Carbon Tetrachloride	A	0
12. Chloroform	A	0
13. Chromic Acid, 60%	B	0
14. Cresol	A	0
15. Dichloroacetic Acid	A	0
16. Dimethylformamide	A	0
17. Dioxane	A	0
18. Ethyl Ether	A	0
19. Formaldehyde, 37%	A	0
20. Formic Acid, 90%	A	0
21. Furfural	B	0
22. Gasoline	A	0
23. Hydrochloric Acid, 37%	B	0
24. Hydrofluoric Acid, 48%	B	1
25. Hydrogen Peroxide, 3%	B	0
26. Tincture of Iodine	B	1
27. Methyl Ethyl Ketone	A	0
28. Methylene Chloride	A	0
29. Monochlorobenzene	A	0

30. Naphthalene	A	N/A
31. Nitric Acid, 20%	B	0
32. Nitric Acid, 33%	B	0
33. Nitric Acid, 70%	B	3
34. Phenol, 90%	A	N/A
35. Phosphoric Acid, 85%	B	0
36. Silver Nitrate, saturated	B	0
37. Sodium Hydroxide, 10%	B	1
38. Sodium Hydroxide, 20%	B	1
39. Sodium Hydroxide, 40%	B	1
40. Sodium Hydroxide, flake	B	1
41. Sodium Sulfide, saturated	B	1
42. Sulfuric Acid, 33%	B	0
43. Sulfuric Acid, 77%	B	1
44. Sulfuric Acid, 96%	B	3
45. Sulfuric Acid, 77% and Nitric Acid, 70% (1:1)	B	3
46. Toluene	A	0
47. Trichloroethylene	A	0
48. Xylene	A	0
49. Zinc Chloride, saturated	B	0

### PART 3 – EXECUTION

#### 3.01 INSTALLERS

##### A. Installer Qualifications:

1. Installer shall have a minimum of 5 years continued experience in installation or application of systems similar to those required for this project.
2. Installer shall be authorized by either the distributor or manufacturer. Warranty will be void if unauthorized installer executes the installation.

#### 3.01 EXAMINATION

##### A. Site Verification of Conditions:

1. Casework will not be delivered or installed until the following conditions have been met:
  - a. Building must be enclosed (windows and doors sealed and weather-tight);
  - b. An operational HVAC system that maintains temperature and humidity at occupancy levels must be in place;
  - c. Ceiling, overhead ductwork and lighting must be installed;
  - d. Site must be free of further construction such as “wet work”;
  - e. Required backing and reinforcements must be installed accurately and the project must be ready for casework installation.
2. In the event that any of the specified requirements for installation are not present at the time of requested delivery, the general contractor or owner must provide the casework manufacturer with

a letter of deviation that releases the manufacturer from any responsibility or liability from any damage to the products resulting from the unfavorable building conditions.

### 3.02 INSTALLATION

#### A. Casework Installation:

1. Casework shall be set with components plumb, straight and square, securely anchored to building structure with no distortion. Concealed shims shall be used as required.
2. Cabinets in continuous runs shall be fastened together with joints flush, uniform and tight with misalignment of adjacent units not to exceed 1/16 of an inch.
3. Wall casework shall be secured to walls that are structural enough to withstand load capacity required by cabinets.
4. Top edge surfaces shall be abutted in one true plane. Joints are to be flush and gap shall not exceed 1/8 of an inch between tops units.
5. Casework and hardware shall be adjusted and aligned to allow for accurate connection of contact points and efficient operation of doors and drawers without any warping or binding.

#### B. Countertop Installation:

1. Countertops are to have been fabricated in lengths according to drawings, with ends abutting tightly and sealed with corrosion resistant sealant.
2. Tops will be anchored to base casework in a single true plane with ends abutting at hairline joints with no raised edges at joints.
3. Joints shall be factory prepared having no need for in-field processing of top and edge surfaces.
4. Joints shall be dressed smoothly, surface scratches removed and entire surface cleaned thoroughly.

### 3.03 CLEANING

- A. Ensure all products are unsoiled and match factory finish. Remove or repair damaged or defective units.
- B. Clean all finished surfaces, including drawers and cabinet shelves, and touch up as necessary.
- C. Countertops shall be cleaned and free of grease or streaks.

### 3.04 PROTECTION

- A. Counter tops and ledges shall be protected with 1/4 inch ribbed cardboard for the remainder of the construction process.
- B. Examine casework for damaged or soiled areas; replace, repair, and touch-up as required.
- C. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Countertops for architectural cabinet work.
- B. Wall-hung counters and vanity tops.
- C. Solid surface countertops.
- D. Stainless steel countertops.

1.02 RELATED REQUIREMENTS

- A. Section 06 41 00 - Architectural Wood Casework.
- B. Section 12 35 53 - Wood Laboratory Casework: Laboratory countertops.

1.03 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard; 2009.
- B. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2009.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- D. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2014.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
- F. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2016).
- G. IAPMO Z124 - Plastic Plumbing Fixtures; 2017.
- H. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.
- I. PS 1 - Structural Plywood; 2009.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.
- D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.
- F. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- G. Installation Instructions: Manufacturer's installation instructions and recommendations.
- H. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOPS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
  - 1. Flat Sheet Thickness: 1/2 inch, minimum.
  - 2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
    - a. Manufacturers:
      - 1) Basis of Design: Wilsonart: [www.wilsonart.com](http://www.wilsonart.com).
      - 2) Substitutions: 01 25 00 - Substitution Procedures.
    - b. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
    - c. NSF approved for food contact.
    - d. Sinks and Bowls: Separate units for undercounter mounting; minimum 3/4 inch wall thickness; comply with IAPMO Z124.
    - e. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
    - f. Color and Pattern: As selected by MBI Companies from manufacturer's standard line.
  - 3. Other Components Thickness: 1/2 inch, minimum.
  - 4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; radiused edge; use marine edge at sinks.
  - 5. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
  - 6. Skirts: As indicated on drawings.
  - 7. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Premium Grade.
- C. Stainless Steel Countertops: ASTM A666, Type 304, stainless steel sheet; 16 gauge, 0.0625 inch nominal sheet thickness.
  - 1. Finish: 4B satin brushed finish.
  - 2. Exposed Edge Shape: Bullnose with return; 5/8 inch radius, return to face of case; reinforced with hardwood or steel.
  - 3. Back and End Splashes: Same material; welded 1/4 inch radius coved joint to countertop; square top edge with 1 inch wide top surface and minimum 1/2 inch turndown.
  - 4. Splash Dimensions: 4 inch high by 1 inch thick, unless otherwise indicated.
  - 5. Splash Depth Where Faucets are Mounted in Splash: 2 inches.
  - 6. Splash Height: As indicated on drawings.
  - 7. Sinks: Same material, same thickness; flush welded to counter; bottom sloped to outlet; radiused interior corners; drain outlet located in back corner.

8. Troughs: Same material; bottom sloped to outlet.
9. Associated Reagent Shelves: Same material, with formed raised edges.

## 2.02 MATERIALS

- A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.
- B. Particleboard for Supporting Substrate: ANSI A208.1 Grade 2-M-2, 45 pcf minimum density; minimum 3/4 inch thick; join lengths using metal splines.
- C. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2.
- D. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- E. Joint Sealant: Mildew-resistant silicone sealant, white.

## 2.03 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
  1. Join lengths of tops using best method recommended by manufacturer.
  2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
    - a. Rout a 1/8 inch drip groove at underside of exposed overlapping edges, set back 1/2 inch from face of edge.
  3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
  1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
  2. Height: 4 inches, unless otherwise indicated.
- C. Stainless Steel: Fabricate tops up to 144 inches long in one piece including nosings and back and end splashes; accurately fitted mechanical field joints in lengths over that dimension are permitted.
  1. Weld joints; grind smooth and polish to match.
  2. Provide stainless steel hat channel stiffeners, welded or soldered to underside, where indicated on drawings.
  3. Provide wall clips for support of back/end splash turn downs.
  4. Sound Deadening: Apply water resistant, fire resistant sound deadening mastic to entire bottom surface.
- D. Wall-Mounted Counters: Provide brackets as indicated on drawings.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify MBI Companies of unsatisfactory preparation before proceeding.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

### 3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### 3.03 INSTALLATION

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Attach stainless steel countertops using stainless steel fasteners and clips.

- C. Seal joint between back/end splashes and vertical surfaces.

3.04 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
- B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
- C. Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING

- A. Clean countertops surfaces thoroughly.

3.06 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Telescoping bleachers.

1.02 RELATED REQUIREMENTS

- A. Section 09 62 00 – Resilient Athletic Flooring.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. NFPA 102 - Standard for Grandstands, Folding and Telescopic Seating, Tents, and Membrane Structures; 2016.
- C. PS 1 - Structural Plywood; 2009.
- D. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).
- E. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage handling and requirements.
  - 3. Installation methods.
- C. Shop Drawings: Complete layout with dimensions, seat heights, row spacing and rise, aisle widths and locations, points of connection to substrate, assembly dimensions, and material types and finishes.
  - 1. Provide drawings customized to this project.
  - 2. Include Professional Engineer certification.
  - 3. Graphics Layout Drawings: Indicate pattern of contrasting seat colors.
- D. Selection Samples: For each material for which color selection is required, submit samples, 2 by 2 inches in size, illustrating colors and finishes available.
- E. Verification Samples: For each custom colored finish, submit samples of actual finish or product, for verification of color selection.
- F. Operation and Maintenance Data: Manufacturer's operation and maintenance instructions, including annual inspection and maintenance and bi-annual inspection by a Professional Engineer or manufacturer factory service personnel.
- G. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
- B. Installer Qualifications: Manufacturer's installation crew.
- C. Welder Qualifications: Certified by AWS for the process employed.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store, in original packaging, under cover and elevated above grade.

1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

- B. Correct defective Work within a five year period after Date of Substantial Completion. Replace parts that fail under normal use at no extra charge to Owner.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Telescoping Bleachers:
1. Interkal LLC: [www.interkal.com](http://www.interkal.com).
  2. Irwin Telescopic Seating Company: [www.irwintelescopicseating.com](http://www.irwintelescopicseating.com).
  3. Hussey Seating Company: [www.husseyseating.com](http://www.husseyseating.com).
  4. Substitutions: 01 25 00 - Substitution Procedures.

### 2.02 TELESCOPING BLEACHERS

- A. Telescoping Bleachers: Factory assembled tiered benches that retract horizontally into depth approximately the same as a single row depth, with fixed seats mounted on leading edge of platforms.
1. Provide a design certified by a licensed Professional Engineer licensed in the State in which the Project is located.
  2. Design to comply with applicable requirements of NFPA 102 and requirements of code authorities having jurisdiction; where conflicts between requirements occur, comply with whichever is more stringent.
  3. Design with solid fascia (riser) or seat fronts that conceal interior mechanisms when fully retracted, fitting tightly enough to prevent climbing up face; at front row provide key locked, hinged fascia (skirt) to cover gap between seat riser/fascia and floor.
  4. Configurations: As indicated on drawings.
  5. Wheelchair Spaces: Permanent open spaces at locations indicated on drawings in compliance with ADA Standards.
  6. Cutouts: Fit units to irregular wall surfaces, columns, pilasters, roof drain leaders, and other obstructions; take field measurements prior to fabrication.
  7. Operation: Motor operated.
- B. Design Loads: Design to withstand the following loading conditions:
1. Live Load on Structural Supports: 100 psf, minimum, of gross horizontal projection.
  2. Live Load on Seats and Walking Surfaces: 120 pounds per linear foot.
  3. Lateral Sway Stress on Structural Supports: 24 pounds per linear foot of seat plank.
  4. Perpendicular Sway Stress on Structural Supports: 10 pounds per linear foot of seat plank.
- C. Dimensions:
1. See drawings for overall dimensions.
- D. Structural Supports: Steel or aluminum; manufacturer's standard wheeled carriages supporting each tier separately, with moving parts permanently lubricated and metal parts cushioned to prevent metal-to-metal contact during operation.
1. Design so that each row carriage so that it will individually support the design loads and is self supporting when fully assembled without dependence on platform panels or boards, seats, or fascia.
  2. Welding: In accordance with AWS D1.1/D1.1M and AWS D1.3/D1.3M.
  3. Bolting: Use lock-washers or locknuts.
  4. Wheels: Minimum 5 inch diameter by 1-1/8 inch wide, with non-marring rubber tires; ball, roller, or oil-impregnated metal bearings; minimum of 2 wheels at each floor support.
  5. Finish: Manufacturer's standard enamel or powder coating.
  6. Row Locking: Automatically mechanically lock each carriage to adjacent carriages when fully extended.
  7. Unlocking: Automatically unlock all rows before engaging retraction mechanism.

### 2.03 SEAT AND PLATFORM COMPONENTS

- A. Seat/Fascia Assembly: Continuous, molded UV-stabilized high-density polyethylene plastic, seat minimum 1 inch thick, textured finish, homogeneous color throughout, color as selected from manufacturer's standard selection; approximately 18 inch long sections independently removable with tongue-and-groove or rabbeted interlock at end joints.

1. Shape: Ergonomically contoured, with internal ribs spaced for natural flexibility; rear edge cantilevered to provide toe room of not less than 3 inches; no openings to trap debris.
2. Provide end caps of same material and finish on each exposed end.
3. Supports: Internal steel reinforcement of each seat segment bolted to platform nose member; minimum two bolts per segment.

B. Platform, Tread, and Step Structure: Plywood continuously supported on front and rear with side joints tongue-and-grooved.

1. Plywood: PS 1, 5-ply southern pine or polyethylene-overlaid douglas fir or southern pine, Grade A-C.
2. Plywood Thickness: 5/8 inch, minimum.
3. Front (Nose), Rear, and Intermediate Supports: Steel channel or tube, hot-dipped galvanized.
4. Provide end caps of same material and finish on each exposed end.
5. Finish: High gloss clear urethane, both sides, unless polyethylene finished.
6. Nosings: Formed steel, minimum, G60/Z275 hot-dipped galvanized.
7. At aisles provide permanently attached intermediate steps of same construction and finish.
8. At bottom of aisles provide step in front of first riser, hinged to first platform to fold for storage.

2.04 HANDRAILS AND RAILINGS

A. Provide the following railings:

1. Aisle Handrails: Single post folding railing segment mounted in center of aisle at every other row beginning at row 2.
2. End of Row Guardrails: Self-storing, at open ends of sections beginning at row 2.
3. Height: 42 inches above adjacent platform or tread.

B. Design handrails and railings to withstand the following loads:

1. Concentrated Load on Handrails: 200 pounds in any direction.
2. Concentrated Load on Guardrails: 200 pounds in any direction along top rail.
3. Live Load on Handrails: 50 pounds per linear foot, applied in any direction.
4. Live Load on Guardrails:
  - a. Horizontal: 50 pounds per linear foot, applied at the guardrail height.
  - b. Vertical: 100 pounds per linear foot, applied vertically to top of guardrail.

C. Railing Construction: Round steel or aluminum pipe or tube, with formed elbows at corners and caps at ends of straight runs.

1. Aluminum: 1.66 inches minimum outside diameter; natural anodized finish.
2. Steel: 1-1/2 inch minimum outside diameter, with 11 gauge, 0.12 inch minimum wall thickness; textured powder coat epoxy finish.

2.05 ACCESSORIES

A. Fillers and Closures:

1. Ends of Retracted Units: Plywood panels, finished to match platforms.
2. Top Row: Provide seat level rear filler panels to close openings between top row seat and wall; finish to match platforms.
3. Sides of Extended Units: Vinyl curtains.
4. Vinyl Curtains: 18 ounce vinyl with grommets; color as selected by Architect from manufacturer's standard palette.

B. Motion Monitor: Strobe light and warning horn rated at 150 dB, both of which operate continuously during movement of any section of bleachers; mount strobe light where it is clearly visible to entire bleacher installation.

C. Scorer's Table: 8 feet wide by 15 inches deep; relocatable to any row of any section without mounting brackets.

D. Fasteners: Provide hardware and fasteners in accordance with manufacturer's recommendations.

E. Anchorage: As indicated on drawings; provide hardware in accordance with manufacturer's recommendations.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that field measurements are consistent with those on the shop drawings.
- B. Verify that electrical rough-ins have been installed and are accessible.
- C. Do not begin installation until substrates have been properly prepared and area has been cleared of obstructions.
- D. If substrate preparation is the responsibility of another installer, notify MBI Companies of unsatisfactory preparation before proceeding.

#### 3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

#### 3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Do not field cut or alter seats, fascia, or structural members without approval.
- C. Provide manufacturer's field representative to inspect completed installation.

#### 3.04 ADJUSTING

- A. Lubricate, test, and adjust each moving assembly to ensure proper operation in compliance with manufacturer's recommendations.

#### 3.05 CLEANING

- A. Clean exposed and semi-exposed assembly surfaces.
- B. Touch up finishes on damaged or soiled areas.

#### 3.06 CLOSEOUT ACTIVITIES

- A. Demonstration and Training: Provide manufacturer's field representative to demonstrate to and train Owner's operating personnel in proper operation of equipment.
  - 1. Location: On site using installed equipment.
  - 2. Time: As agreed between Owner and Contractor.

#### 3.07 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair, or replace damaged products before Date of Substantial Completion.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Epoxy coated bolted steel tank.

1.02 REFERENCES

- A. AWWA - American Water Works Association, Inc.:  
1. AWWA D103 - Factory Coated Bolted Steel Tanks for Water Storage
- B. NFPA - National Fire Protection Association  
1. NFPA 22 - Water tanks for private fire protection, factory-coated, bolted steel
- C. ASTM International:  
1. ASTM A36 - Specification for Structural Steel.  
2. ASTM A153 - Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.  
3. ASTM A307 - Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.  
4. ASTM A570 - Specification for Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality.

1.03 WARRANTY

- A. The tank manufacturer shall warrant the tank against any defects in workmanship and materials for a period of one (1) year from the date of acceptance by the Owner. In the event any such defect should appear, it should be reported in writing to the Contractor during the warranty period.

1.04 DESIGN REQUIREMENTS

- A. Size of ground storage reservoir(s) shall be as shown on drawings.
- B. Approved Manufacturer:  
1. The tank(s) specified in this section shall be manufactured in substantial accordance with the Contract Documents by a manufacturer meeting the requirements stated herein may be acceptable providing the Bidder obtaining prior approval in accordance with Article 11 of the "Instructions to Bidders". These Specifications and Drawings have been prepared using technical data and dimensions for standard API 12B design.  
2. The tank manufacturer shall be quality certified, having an active API-Q1 Certification and ISO-9001 Registration.  
3. The tank manufacturer must have experience in the manufacturing of bolted steel tanks and have in the last two (2) years manufactured at least five (5) tanks of similar size and use.  
4. Basis of Design: Columbian TecTank (HydroTec® CS) manufactured by CST Storage Parsons, KS.
- C. Alternate Equipment:  
1. CONTRACTOR shall assume overall undivided responsibility for the functioning of the alternate equipment.  
2. The cost of any changes incidental to installation of the alternate equipment such as electrical wiring, relocation of piping, engineering design or supervision, as-built drawings, etc., shall be borne by the CONTRACTOR with no additional expense to the OWNER.

1.05 QUALITY ASSURANCE AND QUALIFICATIONS

- A. All equipment furnished under this Specification shall be new and unused, shall be the standard product of manufacturers having a successful record of manufacturing and servicing the equipment and systems specified herein for a minimum of five (5) years.

## 1.06 SUBMITTALS

- A. Submittals shall include at least the following and shall be provided in accordance with Section 01 30 00 – Administrative Requirements.
1. Shop and erection drawings showing all important details of construction and dimensions.
  2. Descriptive literature, bulletins, and/or catalogs of all accessories indicated on the Drawings and specified herein.

## PART 2 PRODUCTS

### 2.01 TANK STRUCTURE

- A. The materials, design, fabrication, and erection of the epoxy coated bolted steel tank shall conform to NFPA 22, AWWA D103, latest revision and API 12B.
- B. Materials:
1. Steel sheets shall conform to, or be at least equal to, hot-rolled quality per ASTM A570 Grade 33 with a minimum yield strength of 33,000 psi. Minimum thickness shall be 12 gauge (0.0972" minimum).
  2. Steel plates shall conform to, or at least be equal to, the requirements of ASTM A36 with a minimum yield strength of 36,000 psi.
  3. Rolled structural shapes shall conform to ASTM A36.
  4. Vertical tanks seams shall be staggered. Straight seam 4-corner joints are not acceptable. Horizontal seam lap joints are not acceptable.
- C. Bolts:
1. Bolts used in tank joints shall be ½ inch diameter and shall meet the minimum requirements of API 12B, Appendix A. All bolt heads shall be square, plastic encapsulated hot dip galvanized to ASTM A153.
  2. Other bolts shall conform as a minimum to the latest revision of ASTM A307.

### 2.02 TANK FOUNDATION

- A. The materials, design, fabrication, and construction of the tank foundation shall conform to AWWA D103, latest revision, Section 11.
1. The tank foundation shall be per drawings to safely sustain the loads from the tank.
  2. The foundations shall be level with differential not exceeding +P 1/8 inch in any 30-foot circumference under the shell. The levelness on the circumference shall not vary more than +/- 1/4 inch from an established plane
  3. Vapor barrier shall be .006" (6 mils) thick.

### 2.03 GASKETS

- A. All bolted connections shall incorporate an EPDM white, prefabricated, by nylon reinforced gasket minimum width 1-3/4" or a FDA approved equal. Field caulking will be allowed when joining a discontinuous gasket section and at certain joint connections. Neoprene backed steel washers shall be provided at all bolts in contact with the stored liquid.

### 2.04 EPOXY COATING

- A. All metal plates, supports, members, and miscellaneous parts, except bolts, certain accessories and appurtenances shall be factory coated in accordance with the provisions of these specifications.
- B. Field coating, except for touch-up will not be permitted.
1. Interior: Thermally cured modified epoxy powder, Trico-Bond EP by CST Storage (includes underside of steel floor).

2. Exterior: Thermally cured modified epoxy, Trico-Bond EP and Acrylic Polyurethane by CST Storage.

## 2.05 ACCESSORIES

- A. Accessory equipment shall be provided in accordance with Section 5 of AWWA D103, latest revision and NFPA 22 and as included herein or as shown on the drawings:
1. One (1) 24-inch x 46-inch rectangular shell manway and One (1) 24-inch diameter shell manway with bolt-on hinged cover with suitable reinforcing located approximately 1' - 6" above the tank floor.
  2. One (1) 24-inch standard roof hatch with hasp and curb located near the tank ladder. The tank roof hatch shall have a curved, upward opening 24" square. The curb shall extend at least four (4") inches above the tank. The hatch cover lip shall be hinged and provisions made for locking. The hatch cover lip should extend for a distance of two (2") inches down on the outside of the curb.
  3. One (1) suitable screened and vented finial located at the roof apex. Vent shall be bolted to the cover plate of the center manhole on the roof. Vent will be tank manufacturer's standard type mushroom vent with aluminum bird screen. The free area of the vent shall be sized fifty (50%) percent in excess of the required capacity to pass air so that the maximum possible rate of the water, either entering or leaving the tank does not develop excessive pressure. The overflow pipe shall not be considered a tank vent. The vent shall be designed to ensure fail-safe operation in the event that screen frosts over and the bottom of the screen shall be sufficiently elevated for snow consideration in the area.
  4. A ladder on the outside of the tank shall be equipped with an anti-climb device.
  5. Access from the outside shell ladder to roof hatches and vents per AWWA D103, latest revision, NFPA 22 and OSHA requirements.
  6. One (1) inch diameter steel pipe outlet connection for pump suction including vortex breaker.
  7. One (1) inch diameter steel pipe tank fill inlet connection.
  8. One (1) inch diameter steel pipe drain connection.
  9. One (1) inch diameter overflow connection and weir box. The overflow shall empty over a 3'-0" by 5'-0" splash block as indicated on the Drawings.
  10. One (1) Target Style Level Indicator: The gauge board shall be 1" x 8" aluminum, painted with black marks at 12" on center. The target shall be of 12" diameter, 1/4" thick, aluminum construction and painted red. Target pulleys, cables, idlers, etc. shall be of stainless steel construction.

## PART 3 EXECUTION

### 3.01 EPOXY COATING APPLICATION

- A. Surface Preparation:
1. Tank parts shall be thoroughly washed (Alkaline at 130° F) and rinsed to remove grease, oil and foreign matter.
  2. Parts are then immediately oven dried
  3. Parts shall be grit-blasted to SSPC-SP10 (near-white blasted cleaning) to 1-2 mils profile
  4. All parts must be coated by Automated Powder Applicators on both sides within 15 minutes after blasting, and no further processing other than coating shall be done.
- B. Interior Coating:
1. First Coat: Electrostatic powder application of NSF approved modified epoxy Trico-Bond EP, 7.0 mils average dry film thickness.
  2. Interior coating system to have 7.0 mils AVG DFT.

- C. Exterior Coating:
  - 1. First Coat: Electrostatic powder application of modified epoxy Trico-Bond EP, 3.0 mils average dry film thickness.
  - 2. Second Coat: Electrostatic application of Acrylic Polyurethane, 1.5 mils average dry film thickness.
  - 3. Exterior coating system to have 4.5 mils AVG DFT.
- D. Curing:
  - 1. Baking ovens shall be used after each coat.
  - 2. Initial curing shall take place after powder is applied. A combination of IR boosters and convection ovens will be used to heat parts to approximately 300° F to gel the powder (partial cross-linking).
  - 3. Final curing shall take place after top coat is applied. A combination of IR boosters and convection ovens will be used to heat parts to approximately 350° F for 5-6 minutes to finish curing powder and topcoat.
- E. Inspection:
  - 1. MEK rub test to verify proper curing of coating.
  - 2. Wet sponge test to check for holidays.
  - 3. Mil thickness test for uniform epoxy coverage.
- F. Preparation for Transport:
  - 1. Material to be marked or tagged with part number for ease of field assembly.
  - 2. Tank materials to be placed in racks or on pallets to facilitate transportation to jobsite.
  - 3. Touch-up paint with instructions for application by erection personnel.

### 3.02 ERECTION

- A. Field erection of tank shall be in strict accordance with the manufacturer's recommendations. The foundation shall be compacted on a prepared subgrade compacted to 100% standard proctor density. The gravel base shall be covered with the vapor barrier. Foundation shall be level with differential not exceeding  $\pm 1/8"$  in any 30 foot circumference. The levelness on the circumference shall not vary by more than  $\pm 1/4"$  from an established plane. Particular care shall be exercised in handling and bolting of the tank plates, supports, and members to avoid abrasion or scratching of the coating. Touch-up coating shall be done in accordance with manufacturer's recommendations where and as directed.

### 3.03 TESTING

- A. Following completion of erection and cleaning of the tank, the tank shall be tested for liquid-tightness by filling the tank to its overflow elevation.
- B. Any leaks disclosed by this test shall be corrected by the CONTRACTOR in accordance with the manufacturer's recommendations.

END OF SECTION

## 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. Section Includes:
  - 1. Copper building wire rated 600 V or less.
  - 2. Metal-clad cable, Type MC, rated 600 V or less.
  - 3. Connectors, splices, and terminations rated 600 V and less.

### 1.3 DEFINITIONS

- A. RoHS: Restriction of Hazardous Substances.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

## PART 2 - PRODUCTS

### 2.1 COPPER BUILDING WIRE

- A. Description: Flexible, insulated, and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- B. Standards:
  - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
  - 2. RoHS compliant.
- C. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.
- D. Conductor Insulation:
  - 1. Type THHN and Type THWN-2: Comply with UL 83.

## 2.2 METAL-CLAD CABLE, TYPE MC

- A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.
- B. Standards:
  - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
  - 2. Comply with UL 1569.
- C. Circuits:
  - 1. Single circuit.
- D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.
- E. Ground Conductor: Insulated.
- F. Conductor Insulation:
  - 1. Type TFN/THHN/THWN-2: Comply with UL 83.
- G. Armor: Steel, interlocked.

## 2.3 FIRE-ALARM WIRE AND CABLE

- A. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.
- B. Signaling Line Circuits: Twisted, shielded pair, not less than No. 18 AWG recommended by system manufacturer.
- C. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation, and complying with requirements in UL 2196 for a two-hour rating.
  - 1. Low-Voltage Circuits: No. 16 AWG, minimum, in pathway.
  - 2. Line-Voltage Circuits: No. 12 AWG, minimum, in pathway.

## 2.4 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

C. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.

1. Material: Copper.
2. Type: Two hole with standard barrels.
3. Termination: Compression.

## PART 3 - EXECUTION

### 3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- C. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

### 3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN/THWN-2, single conductors in raceway.
- B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN/THWN-2, single conductors in raceway.
- C. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Metal-clad cable, Type MC.
- D. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

### 3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

- F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

### 3.4 INSTALLATION OF FIRE-ALARM WIRING

- A. Comply with NECA 1 and NFPA 72.
- B. Wiring Method: Install wiring in metal pathway according to Section 270528.29 "Hangers and Supports for Communications Systems."
  - 1. Fire-alarm circuits and equipment control wiring associated with fire-alarm system shall be installed in a dedicated pathway system. This system shall not be used for any other wire or cable.
- C. Wiring Method:
  - 1. Cables and pathways used for fire-alarm circuits, and equipment control wiring associated with fire-alarm system, may not contain any other wire or cable.
  - 2. Fire-Rated Cables: Use of two-hour, fire-rated fire-alarm cables, NFPA 70, Types MI and CI, is not permitted.
- D. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with fire-alarm system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
- E. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes; cabinets; or equipment enclosures where circuit connections are made.
- F. Color-Coding: Color-code fire-alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire-alarm system junction boxes and covers red.

### 3.5 CONNECTIONS

- A. 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-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

3.6 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor and identify as spare conductor.

3.7 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.8 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

END OF SECTION



## 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. Section includes grounding and bonding systems and equipment.

## PART 2 - PRODUCTS

### 2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

### 2.2 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
  - 1. Stranded Conductors: ASTM B8.
- C. Grounding Bus: Predrilled rectangular bars of annealed copper as indicated on drawings.

## PART 3 - EXECUTION

### 3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Grounding Conductors: Green-colored insulation with continuous yellow stripe.
- C. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

1. Install bus horizontally, on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.

### 3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Water Heater: Install a separate insulated equipment grounding conductor to each electric water heater. Bond conductor to heater units, piping, connected equipment, and components.

### 3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

END OF SECTION

## 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. Section Includes:
  - 1. Steel slotted support systems.
  - 2. Conduit and cable support devices.
  - 3. Structural steel for fabricated supports and restraints.
  - 4. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
  - 5. Fabricated metal equipment support assemblies.

## PART 2 - PRODUCTS

### 2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch- (10-mm-) diameter holes at a maximum of 8 inches (200 mm) o.c. in at least one surface.
  - 1. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
  - 2. Material for Channel, Fittings, and Accessories: Galvanized steel.
  - 3. Channel Width: Selected for applicable load criteria.
  - 4. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-
- B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- C. Structural Steel for Fabricated Supports and Restraints: ASTM A36/A36M steel plates, shapes, and bars; black and galvanized.
- D. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
  - 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F3125/F3125M, Grade A325 (Grade A325M).
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

## 2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:
  1. NECA 1.
  2. NECA 101
- B. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.
- C. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."
- D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
- E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps.

- F. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

### 3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
  1. To Wood: Fasten with lag screws or through bolts.
  2. To New Concrete: Bolt to concrete inserts.
  3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
  4. To Existing Concrete: Expansion anchor fasteners.
  5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
  6. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
  7. To Light Steel: Sheet metal screws.
  8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

### 3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Section 055000 "Metal Fabrications" for site-fabricated metal supports.

- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

#### 3.4 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
  - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.

END OF SECTION

## 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. Section Includes:
  - 1. Metal conduits and fittings.
  - 2. Boxes, enclosures, and cabinets.
  - 3. Nonmetallic conduits and fittings.
- B. Related Requirements:
  - 1. Section 078413 "Penetration Firestopping" for firestopping at conduit and box entrances.

### 1.3 DEFINITIONS

- A. GRC: Galvanized rigid steel conduit.

## PART 2 - PRODUCTS

### 2.1 METAL CONDUITS AND FITTINGS

- A. Metal Conduit:
  - 1. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  - 2. GRC: Comply with ANSI C80.1 and UL 6.
  - 3. EMT: Comply with ANSI C80.3 and UL 797.
  - 4. FMC: Comply with UL 1; zinc-coated steel.
  - 5. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- B. Metal Fittings:
  - 1. Comply with NEMA FB 1 and UL 514B.
  - 2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  - 3. Fittings, General: Listed and labeled for type of conduit, location, and use.
  - 4. Fittings for EMT:

- a. Material: Steel.
  - b. Type: Compression.
- 5. Expansion Fittings: steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
- C. Joint Compound GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

## 2.2 NONMETALLIC CONDUITS AND FITTINGS

- A. Nonmetallic Conduit:
  - 1. Listing and Labeling: Nonmetallic conduit shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  - 2. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
  - 3. LFNC: Comply with UL 1660.
- B. Nonmetallic Fittings:
  - 1. Fittings, General: Listed and labeled for type of conduit, location, and use.
  - 2. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
    - a. Fittings for LFNC: Comply with UL 514B.
  - 3. Solvents and Adhesives: As recommended by conduit manufacturer.

## 2.3 BOXES, ENCLOSURES, AND CABINETS

- A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- D. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- E. Metal Floor Boxes:
  - 1. Material: Cast metal or sheet metal].
  - 2. Type: Fully adjustable.
  - 3. Shape: Rectangular.

4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.
- G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- H. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.
- I. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- J. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep) for quad mounting of devices or 4 inches by 2-1/8 inches by 2-1/8 inches deep (100 mm by 60 mm by 60 mm deep single device mounting).
- K. Gangable boxes are prohibited.
- L. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.
1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
  2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- M. Cabinets:
1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
  2. Hinged door in front cover with flush latch and concealed hinge.
  3. Key latch to match panelboards.
  4. Metal barriers to separate wiring of different systems and voltage.
  5. Accessory feet where required for freestanding equipment.
  6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

## PART 3 - EXECUTION

### 3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed Conduit: GRC.
  2. Concealed Conduit, Aboveground: GRC.
  3. Underground Conduit: RNC, Type Schedule 80 PVC direct buried, concrete encased under paved areas.

4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
  5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT.
  2. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:
    - a. Corridors and rooms used for traffic of mechanized carts, tractors, mowers, forklifts, and pallet-handling units.
  3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
  4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
  5. Damp or Wet Locations: GRC.
  6. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250.
- C. Minimum Raceway Size: 3/4-inch (16-mm) trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
  2. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.
  3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

### 3.2 INSTALLATION

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.
- D. Do not fasten conduits onto the bottom side of a metal deck roof.
- E. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- F. Complete raceway installation before starting conductor installation.
- G. Arrange stub-ups so curved portions of bends are not visible above finished slab.

- H. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.
- I. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- J. Support conduit within 12 inches (300 mm) of enclosures to which attached.
- K. Stub-Ups to Above Recessed Ceilings:
  - 1. Use EMT for raceways.
  - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- L. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- M. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- N. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- O. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- P. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- Q. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.
- R. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
  - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
  - 2. Where an underground service raceway enters a building or structure.
  - 3. Conduit extending from interior to exterior of building.
  - 4. Where otherwise required by NFPA 70.
- S. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 36 inches (915 mm) of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
- T. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- U. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.
- V. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- W. Locate boxes so that cover or plate will not span different building finishes.
- X. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- Y. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- Z. Set metal floor boxes level and flush with finished floor surface.

### 3.3 INSTALLATION OF UNDERGROUND CONDUIT

- A. Direct-Buried Conduit:
  1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe less than 6 inches (150 mm) in nominal diameter.
  2. Install backfill as specified in Section 312000 "Earth Moving."
  3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."
  4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
    - a. Couple steel conduits to ducts with adapters designed for this purpose.

### 3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.5 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.6 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
  - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

END OF SECTION



## 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. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

#### B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

## PART 2 - PRODUCTS

### 2.1 SLEEVES

#### A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

- B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

- C. PVC-Pipe Sleeves: ASTM D1785, Schedule 40.

- D. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

- E. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

F. Sleeves for Rectangular Openings:

1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:
  - a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
  - b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.2 SLEEVE-SEAL SYSTEMS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
1. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
  2. Pressure Plates: Carbon steel.
  3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

- A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

2.4 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.

- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

### PART 3 - EXECUTION

#### 3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
  - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
    - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
    - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
  - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
  - 3. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
  - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
  - 5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level. Install sleeves during erection of floors.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
  - 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
  - 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

### 3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.
- B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

### 3.3 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION

## 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. Section Includes:
  - 1. Color for conductors, and warning labels and signs.
  - 2. Signs.
  - 3. Fasteners for labels and signs.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Comply with NFPA 70.
- B. Comply with NFPA 70E requirements for arc-flash warning labels.
- C. Comply with ASME A13.1.
- D. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- E. Comply with ANSI Z535.4 for safety signs and labels.

### 2.2 COLOR AND LEGEND REQUIREMENTS

- A. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.
  - 1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
  - 2. Colors for 208/120-V Circuits:
    - a. Phase A: Black.
    - b. Phase B: Red.
    - c. Phase C: Blue.

3. Color for Neutral: White.
4. Color for Equipment Grounds: Green.

B. Equipment Identification Labels:

1. Black letters on a white field.

C. Warning labels and signs shall include, but are not limited to, the following legends:

1. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

## 2.3 SIGNS

A. Baked-Enamel Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal Size: 7 by 10 inches (180 by 250 mm).

B. Metal-Backed Butyrate Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch (1-mm) galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal Size: 10 by 14 inches (250 by 360 mm).

C. Laminated Acrylic or Melamine Plastic Signs:

1. Engraved legend.
2. Thickness:
  - a. For signs up to 20 sq. in. (129 sq. cm), minimum 1/16 inch (1.6 mm) thick.
  - b. For signs larger than 20 sq. in. (129 sq. cm), 1/8 inch (3.2 mm) thick.
  - c. Engraved legend with black letters on white face.
  - d. Punched or drilled for mechanical fasteners with 1/4-inch (6.4-mm) grommets in corners for mounting.
  - e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

## 2.4 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 Deg F (23 Deg C) according to ASTM D638: 12,000 psi (82.7 MPa).
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
4. Color: Black, except where used for color-coding.

## 2.5 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

### 3.2 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
- B. Verify identity of each item before installing identification products.
- C. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- D. Apply identification devices to surfaces that require finish after completing finish work.
- E. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.
- F. Baked-Enamel Signs:
  - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
  - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on minimum 1-1/2-inch- (38-mm-) high sign; where two lines of text are required, use signs minimum 2 inches (50 mm) high.
- G. Metal-Backed Butyrate Signs:
  - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
  - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high sign; where two lines of text are required, use labels 2 inches (50 mm) high.
- H. Laminated Acrylic or Melamine Plastic Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high sign; where two lines of text are required, use labels 2 inches (50 mm) high.

I. Cable Ties: General purpose, for attaching tags, except as listed below:

### 3.3 IDENTIFICATION SCHEDULE

A. Arc Flash Warning Labeling: Self-adhesive labels.

B. Equipment Identification Labels:

1. Indoor Equipment: Baked-enamel signs.
2. Outdoor Equipment: Laminated acrylic or melamine sign 4 inches (100 mm) high.
3. Equipment to Be Labeled:
  - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of a engraved, laminated acrylic or melamine label.
  - b. Enclosures and electrical cabinets.
  - c. Access doors and panels for concealed electrical items.

C. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.

END OF SECTION

## 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. Section includes a computer-based, fault-current study to determine the minimum interrupting capacity of circuit protective devices.

### 1.3 DEFINITIONS

- A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed and salvaged, or removed and reinstalled. Existing to remain items shall remain functional throughout the construction period.
- B. One-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.
- C. Power Systems Analysis Specialist: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located.
- D. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion of the circuit from the system.
- E. SCCR: Short-circuit current rating.
- F. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.
- G. Single-Line Diagram: See "One-Line Diagram."

### 1.4 ACTION SUBMITTALS

- A. Product Data:
  - 1. For computer software program to be used for studies.
  - 2. Submit the following after the approval of system protective devices submittals. Submittals shall be in digital form.
    - a. Short-circuit study input data, including completed computer program input data sheets.
    - b. Short-circuit study and equipment evaluation report; signed, dated, and sealed by a qualified professional engineer.
      - 1) Revised one-line diagram, reflecting field investigation results and results of short-circuit study.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data:
  - 1. For Power System Analysis Specialist.

## 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data:
  - 1. For overcurrent protective devices to include in emergency, operation, and maintenance manuals.
  - 2. The following are from the Short-Circuit Study Report:
    - a. Final one-line diagram.
    - b. Final Short-Circuit Study Report.
    - c. Short-circuit study data files.
    - d. Power system data.

## 1.7 QUALITY ASSURANCE

- A. Study shall be performed using SKM Powertools for Windows v7.0.
- B. This study shall be a delegated design to the study engineer selected.
- C. Power Systems Analysis Specialist Qualifications: Professional engineer licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.
- D. Short-Circuit Study Certification: Short-Circuit Study Report shall be signed and sealed by Power Systems Analysis Specialist.

## PART 2 - PRODUCTS

### 2.1 SHORT-CIRCUIT STUDY REPORT CONTENTS

- A. Executive summary of study findings.
- B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of results.
- C. One-line diagram of modeled power system, showing the following:
  - 1. Protective device designations and ampere ratings.
  - 2. Conductor types, sizes, and lengths.
  - 3. Transformer kilovolt ampere (kVA) and voltage ratings.
  - 4. Motor and generator designations and kVA ratings.
  - 5. Switchboard and panelboard designations and ratings.
  - 6. Derating factors and environmental conditions.
  - 7. Any revisions to electrical equipment required by the study.
- D. Comments and recommendations for system improvements or revisions in a written document, separate from one-line diagram.

E. Protective Device Evaluation:

1. Evaluate equipment and protective devices and compare to available short-circuit currents. Verify that equipment withstand ratings exceed available short-circuit current at equipment installation locations.
2. Tabulations of circuit breaker, fuse, and other protective device ratings versus calculated short-circuit duties.
3. For 600-V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
4. For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in standards to 1/2-cycle symmetrical fault current.
5. Verify adequacy of phase conductors at maximum three-phase bolted fault currents; verify adequacy of equipment grounding conductors and grounding electrode conductors at maximum ground-fault currents. Ensure that short-circuit withstand ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.

F. Short-Circuit Study Input Data:

1. One-line diagram of system being studied.
2. Power sources available.
3. Manufacturer, model, and interrupting rating of protective devices.
4. Conductors.
5. Transformer data.

G. Short-Circuit Study Output Reports:

1. Low-Voltage Fault Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
  - a. Voltage.
  - b. Calculated fault-current magnitude and angle.
  - c. Fault-point X/R ratio.
  - d. Equivalent impedance.
2. Momentary Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
  - a. Voltage.
  - b. Calculated symmetrical fault-current magnitude and angle.
  - c. Fault-point X/R ratio.
  - d. Calculated asymmetrical fault currents:
    - 1) Based on fault-point X/R ratio.
3. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
  - a. Voltage.
  - b. Calculated symmetrical fault-current magnitude and angle.
  - c. Fault-point X/R ratio.
  - d. No AC Decrement (NACD) ratio.
  - e. Equivalent impedance.
  - f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.

## PART 3 - EXECUTION

### 3.1 POWER SYSTEM DATA

- A. Obtain all data necessary for conduct of the study.
  - 1. Verify completeness of data supplied riser diagram. Call any discrepancies to Architect's attention.
  - 2. For equipment included as Work of this Project, use characteristics submitted under provisions of action submittals and information submittals for this Project.
- B. Gather and tabulate the required input data to support the short-circuit study:
  - 1. Product Data for Project's overcurrent protective devices involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
  - 2. Obtain electrical power utility impedance at the service.
  - 3. Power sources and ties.
  - 4. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
  - 5. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip, SCCR, current rating, and breaker settings.
  - 6. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
  - 7. Motor horsepower and NEMA MG 1 code letter designation.
  - 8. Conductor sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).
  - 9. Derating factors.

### 3.2 SHORT-CIRCUIT STUDY

- A. Perform study following the general study procedures contained in IEEE 399.
- B. Study shall be completed and reviewed by engineer of record prior to ordering of equipment where feasible to mitigate ordering of additional equipment. Equipment changes resulting from study recommendations shall be at the sole cost of the contractor.
- C. Calculate short-circuit currents according to IEEE 551.
- D. Base study on device characteristics supplied by device manufacturer.
- E. Begin short-circuit current analysis at the service, extending down to system overcurrent protective devices as follows:
  - 1. To normal system low-voltage load buses where fault current is 10 kA or less.
- F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study all cases of system-switching configurations and alternate operations that could result in maximum fault conditions.
- G. Include the ac fault-current decay from induction motors, synchronous motors, and asynchronous generators and apply to low- and medium-voltage, three-phase ac systems. Also account for the fault-current dc decrement to address asymmetrical requirements of interrupting equipment.

- H. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault and a single line-to-ground fault at each equipment indicated on one-line diagram.
  - 1. For grounded systems, provide a bolted line-to-ground fault-current study for areas as defined for the three-phase bolted fault short-circuit study.
- I. Include in the report identification of any protective device applied outside its capacity.



## 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. Section includes computer-based, overcurrent protective device coordination studies to determine overcurrent protective devices and to determine overcurrent protective device settings for selective tripping.

### 1.3 DEFINITIONS

- A. One-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.
- B. Power System Analysis Specialist: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located.
- C. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion of the circuit from the system.
- D. SCCR: Short-circuit current rating.
- E. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.
- F. Single-Line Diagram: See "One-Line Diagram."

### 1.4 ACTION SUBMITTALS

- A. Product Data:
  - 1. Submit the following after the approval of system protective devices submittals. Submittals shall be in digital form.
    - a. Coordination-study input data, including completed computer program input data sheets.
    - b. Study and equipment evaluation reports.
  - 2. Overcurrent protective device coordination study report; signed, dated, and sealed by a qualified professional engineer.

### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data:
  - 1. For Power Systems Analysis Specialist.

## 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For overcurrent protective devices to include in emergency, operation, and maintenance manuals.
  - 1. The following are from the Coordination Study Report:
    - a. Final one-line diagram.
    - b. Final protective device coordination study.
    - c. Coordination study data files.
    - d. List of all protective device settings.
    - e. Time-current coordination curves.
    - f. Power system data.

## 1.7 QUALITY ASSURANCE

- A. Studies shall be performed using SKM Powertools for Windows v7.0..
- B. Manual calculations are unacceptable.
- C. This study shall be a delegated design to the study engineer selected.
- D. Power Systems Analysis Specialist Qualifications: Professional engineer licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.

## PART 2 - PRODUCTS

### 2.1 COORDINATION STUDY REPORT CONTENTS

- A. Executive summary of study findings.
- B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of results.
- C. One-line diagram of modeled power system, showing the following:
  - 1. Protective device designations and ampere ratings.
  - 2. Conductor types, sizes, and lengths.
  - 3. Transformer kilovolt ampere (kVA) and voltage ratings.
  - 4. Motor and generator designations and kVA ratings.
  - 5. Switchboard and panelboard designations.
  - 6. Any revisions to electrical equipment required by the study.
  - 7. Study Input Data: As described in "Power System Data" Article.
    - a. Short-Circuit Study Output: As specified in "Short-Circuit Study Output Reports" Paragraph in "Short-Circuit Study Report Contents" Article in Section 260573.13 "Short-Circuit Studies."
- D. Protective Device Coordination Study:

1. Report recommended settings of protective devices, ready to be applied in the field. Use manufacturer's data sheets for recording the recommended setting of overcurrent protective devices when available.
  - a. Phase and Ground Relays:
    - 1) Device tag.
    - 2) Relay current transformer ratio and tap, time dial, and instantaneous pickup value.
    - 3) Recommendations on improved relaying systems, if applicable.
  - b. Circuit Breakers:
    - 1) Adjustable pickups and time delays (long time, short time, and ground).
    - 2) Adjustable time-current characteristic.
    - 3) Adjustable instantaneous pickup.
    - 4) Recommendations on improved trip systems, if applicable.
  - c. Fuses: Show current rating, voltage, and class.
- E. Time-Current Coordination Curves: Determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for the switching schemes and for emergency periods where the power source is local generation. Show the following information:
  1. Device tag and title, one-line diagram with legend identifying the portion of the system covered.
  2. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.
  3. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
  4. Plot the following listed characteristic curves, as applicable:
    - a. Power utility's overcurrent protective device.
    - b. Medium-voltage equipment overcurrent relays.
    - c. Medium- and low-voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
    - d. Low-voltage equipment circuit-breaker trip devices, including manufacturer's tolerance bands.
    - e. Transformer full-load current, magnetizing inrush current, and ANSI through-fault protection curves.
    - f. Cables and conductors damage curves.
    - g. Ground-fault protective devices.
    - h. Motor-starting characteristics and motor damage points.
    - i. Generator short-circuit decrement curve and generator damage point.
    - j. The largest feeder circuit breaker in each panelboard.
  5. Maintain selectivity for tripping currents caused by overloads.
  6. Maintain maximum achievable selectivity for tripping currents caused by overloads on series-rated devices.
  7. Provide adequate time margins between device characteristics such that selective operation is achieved.
  8. Comments and recommendations for system improvements.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance of the Work. Devices to be coordinated are indicated on Drawings.
  - 1. Proceed with coordination study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to coordination study may not be used in study.

### 3.2 POWER SYSTEM DATA

- A. Obtain all data necessary for conduct of the overcurrent protective device study.
  - 1. Verify completeness of data supplied in riser diagram on Drawings. Call any discrepancies to Architect's attention.
  - 2. For equipment included as Work of this Project, use characteristics submitted under provisions of action submittals and information submittals for this Project.
- B. Gather and tabulate all required input data to support the coordination study:
  - 1. Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
  - 2. Electrical power utility impedance at the service.
  - 3. Power sources and ties.
  - 4. Short-circuit current at each system bus (three phase and line to ground).
  - 5. Full-load current of all loads.
  - 6. Voltage level at each bus.
  - 7. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
  - 8. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.
  - 9. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
  - 10. For relays, provide manufacturer and model designation, current transformer ratios, potential transformer ratios, and relay settings.
  - 11. Motor horsepower and NEMA MG 1 code letter designation.
  - 12. Low-voltage cable sizes, lengths, number, conductor material, and conduit material (magnetic or nonmagnetic).
  - 13. Medium-voltage cable sizes, lengths, conductor material, cable construction, metallic shield performance parameters, and conduit material (magnetic or nonmagnetic).
  - 14. Data sheets to supplement electrical distribution system one-line diagram, cross-referenced with tag numbers on diagram, showing the following:
    - a. Special load considerations, including starting inrush currents and frequent starting and stopping.
    - b. Transformer characteristics, including primary protective device, magnetic inrush current, and overload capability.

- c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.
- d. Generator thermal-damage curve.
- e. Ratings, types, and settings of utility company's overcurrent protective devices.
- f. Special overcurrent protective device settings or types stipulated by utility company.
- g. Time-current-characteristic curves of devices indicated to be coordinated.
- h. Manufacturer, frame size, interrupting rating in amperes root mean square (rms) symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.
- i. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.
- j. Switchboards and panelboards ampacity, and SCCR in amperes rms symmetrical.

### 3.3 COORDINATION STUDY

- A. Comply with IEEE 242 for calculating short-circuit currents and determining coordination time intervals.
- B. Comply with IEEE 399 for general study procedures.
- C. Study shall be completed and reviewed by engineer of record prior to ordering of equipment where feasible to mitigate ordering of additional equipment. Equipment changes resulting from study recommendations shall be at the sole cost of the contractor.
- D. Base study on device characteristics supplied by device manufacturer.
- E. Begin analysis at the service, extending down to system overcurrent protective devices as follows:
  - 1. To normal system low-voltage load buses where fault current is 10 kA or less.
- F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study all cases of system-switching configurations and alternate operations that could result in maximum fault conditions.
- G. Transformer Primary Overcurrent Protective Devices:
  - 1. Device shall not operate in response to the following:
    - a. Inrush current when first energized.
    - b. Self-cooled, full-load current or forced-air-cooled, full-load current, whichever is specified for that transformer.
    - c. Permissible transformer overloads according to IEEE C57.96 if required by unusual loading or emergency conditions.
  - 2. Device settings shall protect transformers according to IEEE C57.12.00, for fault currents.
- H. Motor Protection:
  - 1. Select protection for low-voltage motors according to IEEE 242 and NFPA 70.
- I. Conductor Protection: Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and protection recommendations in IEEE 242. Demonstrate that equipment withstands the maximum short-circuit current for a time equivalent to the tripping time of the primary relay

protection or total clearing time of the fuse. To determine temperatures that damage insulation, use curves from cable manufacturers or from listed standards indicating conductor size and short-circuit current.

- J. Generator Protection: Select protection according to manufacturer's written instructions and to IEEE 242.
- K. Include the ac fault-current decay from induction motors, synchronous motors, and asynchronous generators and apply to low- and medium-voltage, three-phase ac systems. Also account for fault-current dc decrement, to address asymmetrical requirements of interrupting equipment.
- L. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault and a single line-to-ground fault at each equipment indicated on one-line diagram.
  - 1. For grounded systems, provide a bolted line-to-ground fault-current study for areas as defined for the three-phase bolted fault short-circuit study.
- M. Protective Device Evaluation:
  - 1. Evaluate equipment and protective devices and compare to short-circuit ratings.
  - 2. Adequacy of switchboard and panelboard bus bars to withstand short-circuit stresses.
  - 3. Include in the report identification of any protective device applied outside its capacity.

#### 3.4 FIELD ADJUSTING

- A. Adjust relay and protective device settings according to recommended settings provided by the coordination study.
- B. Make modifications to equipment as required to accomplish compliance with short-circuit and protective device coordination study recommendations.

## 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. Section includes a computer-based, arc-flash study to determine the arc-flash hazard distance and the incident energy to which personnel could be exposed during work on or near electrical equipment.

### 1.3 DEFINITIONS

- A. One-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.
- B. Power Systems Analysis Specialist: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located.
- C. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion from the system.
- D. SCCR: Short-circuit current rating.
- E. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.
- F. Single-Line Diagram: See "One-Line Diagram."

### 1.4 ACTION SUBMITTALS

- A. Study Submittals: Submit the following submittals after the approval of system protective devices submittals. Submittals shall be in digital form:
  - 1. Arc-flash study input data, including completed computer program input data sheets.

### 1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For arc-flash hazard analysis software, certifying compliance with IEEE 1584 and NFPA 70E.

### 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data:
  - 1. Provide maintenance procedures in equipment manuals according to requirements in NFPA 70E.

2. Operation and Maintenance Procedures: In addition to items specified in Section 017823 "Operation and Maintenance Data," provide maintenance procedures for use by Owner's personnel that comply with requirements in NFPA 70E.

## 1.7 QUALITY ASSURANCE

- A. Study shall be performed using SKM Powertools for Windows v7.0.
- B. Manual calculations are unacceptable.
- C. Power Systems Analysis Specialist Qualifications: Professional engineer in charge of performing the arc-flash study, analyzing the arc flash, and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.
- D. Arc-Flash Study Certification: Arc-Flash Study Report shall be signed and sealed by Power Systems Analysis Specialist.

## PART 2 - PRODUCTS

### 2.1 ARC-FLASH STUDY REPORT CONTENT

- A. Executive summary of study findings.
- B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of results.
- C. One-line diagram, showing the following:
  1. Protective device designations and ampere ratings.
  2. Conductor types, sizes, and lengths.
  3. Transformer kilovolt ampere (kVA) and voltage ratings, including derating factors and environmental conditions.
  4. Motor and generator designations and kVA ratings.
  5. Switchboard and panelboard designations, and ratings.
- D. Study Input Data: As described in "Power System Data" Article.
- E. Short-Circuit Study Output Data: As specified in "Short-Circuit Study Output Reports" Paragraph in "Short-Circuit Study Report Contents" Article in Section 260573.13 "Short-Circuit Studies."
- F. Protective Device Coordination Study Report Contents: As specified in "Coordination Study Report Contents" Article in Section 260573.16 "Coordination Studies."
- G. Incident Energy and Flash Protection Boundary Calculations:
  1. Arcing fault magnitude.
  2. Protective device clearing time.
  3. Duration of arc.
  4. Arc-flash boundary.
  5. Restricted approach boundary.
  6. Limited approach boundary.

7. Working distance.
8. Incident energy.
9. Hazard risk category.
10. Recommendations for arc-flash energy reduction.

- H. Fault study input data, case descriptions, and fault-current calculations including a definition of terms and guide for interpretation of computer printout.

## 2.2 ARC-FLASH WARNING LABELS

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems" for self-adhesive equipment labels. Produce a 3.5-by-5-inch (76-by-127-mm) self-adhesive equipment label for each work location included in the analysis.
- B. Label shall have an orange header with the wording, "WARNING, ARC-FLASH HAZARD," and shall include the following information taken directly from the arc-flash hazard analysis:
1. Location designation.
  2. Nominal voltage.
  3. Protection boundaries.
    - a. Arc-flash boundary.
    - b. Restricted approach boundary.
    - c. Limited approach boundary.
  4. Arc flash PPE category.
  5. Required minimum arc rating of PPE in Cal/cm squared.
  6. Available incident energy.
  7. Working distance.
  8. Engineering report number, revision number, and issue date.
- C. Labels shall be machine printed, with no field-applied markings.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine Project overcurrent protective device submittals. Proceed with arc-flash study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to arc-flash study may not be used in study.

### 3.2 ARC-FLASH HAZARD ANALYSIS

- A. Comply with NFPA 70E and its Annex D for hazard analysis study.
- B. Preparatory Studies: Perform the Short-Circuit and Protective Device Coordination studies prior to starting the Arc-Flash Hazard Analysis.
1. Short-Circuit Study Output: As specified in "Short-Circuit Study Output Reports" Paragraph in "Short-Circuit Study Report Contents" Article in Section 260573.13 "Short-Circuit Studies."

2. Coordination Study Report Contents: As specified in "Coordination Study Report Contents" Article in Section 260573.16 "Coordination Studies."
- C. Calculate maximum and minimum contributions of fault-current size.
  1. Maximum calculation shall assume a maximum contribution from the utility and shall assume motors to be operating under full-load conditions.
  2. Calculate arc-flash energy with the utility contribution at a minimum and assume no motor contribution.
- D. Calculate the arc-flash protection boundary and incident energy at locations in electrical distribution system where personnel could perform work on energized parts.
- E. Include medium- and low-voltage equipment locations.
- F. Calculate the limited, restricted, and prohibited approach boundaries for each location.
- G. Incident energy calculations shall consider the accumulation of energy over time when performing arc-flash calculations on buses with multiple sources. Iterative calculations shall take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors and generators shall be decremented as follows:
  1. Fault contribution from induction motors shall not be considered beyond three to five cycles.
  2. Fault contribution from synchronous motors and generators shall be decayed to match the actual decrement of each as closely as possible (for example, contributions from permanent magnet generators will typically decay from 10 per unit to three per unit after 10 cycles).
- H. Arc-flash energy shall generally be reported for the maximum of line or load side of a circuit breaker. However, arc-flash computation shall be performed and reported for both line and load side of a circuit breaker as follows:
  1. When the circuit breaker is in a separate enclosure.
  2. When the line terminals of the circuit breaker are separate from the work location.
- I. Base arc-flash calculations on actual overcurrent protective device clearing time. Cap maximum clearing time at two seconds based on IEEE 1584, Section B.1.2.

### 3.3 POWER SYSTEM DATA

- A. Obtain all data necessary for conduct of the arc-flash hazard analysis.
  1. Verify completeness of data supplied on riser diagram on Drawings and under "Preparatory Studies" Paragraph in "Arc-Flash Hazard Analysis" Article. Call discrepancies to Architect's attention.
  2. For new equipment, use characteristics from approved submittals under provisions of action submittals and information submittals for this Project.

### 3.4 LABELING

- A. Apply arc-flash label on the front cover of each section of the equipment for each equipment included in the study. Base arc-flash label data on highest values calculated at each location.
- B. Each piece of equipment listed below shall have an arc-flash label applied to it:

1. Medium voltage switchgear.
2. Low-voltage switchboard.
3. Low voltage transformers.
4. Panelboards
5. Safety switches over 250 V.

### 3.5 APPLICATION OF WARNING LABELS

- A. Install arc-flash warning labels under the direct supervision and control of Power System Analysis Specialist.



## 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. Section includes distribution, dry-type transformers with a nominal primary and secondary rating of 600 V and less, with capacities up to 1500 kVA.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type and size of transformer.
  - 2. Include rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, and performance for each type and size of transformer.
- B. Field quality-control reports.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: On receipt, inspect for and note any shipping damage to packaging and transformer.
  - 1. If manufacturer packaging is removed for inspection, and transformer will be stored after inspection, re-package transformer using original or new packaging materials that provide protection equivalent to manufacturer's packaging.
- B. Storage: Store in a warm, dry, and temperature-stable location in original shipping packaging.
- C. Temporary Heating: Apply temporary heat according to manufacturer's written instructions within the enclosure of each ventilated-type unit, throughout periods during which equipment is not energized and when transformer is not in a space that is continuously under normal control of temperature and humidity.
- D. Handling: Follow manufacturer's instructions for lifting and transporting transformers.

### 1.5 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace transformers that fail in materials or workmanship within specified warranty period.
  - 1. Transformer Warranty Period: 12 months from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations: Obtain each transformer type from single source from single manufacturer.

### 2.2 GENERAL TRANSFORMER REQUIREMENTS

- A. Description: Factory-assembled and -tested, air-cooled units for 60-Hz service.
- B. Comply with NFPA 70.
- C. Shipping Restraints: Paint or otherwise color-code bolts, wedges, blocks, and other restraints that are to be removed after installation and before energizing. Use fluorescent colors that are easily identifiable inside the transformer enclosure.

### 2.3 DISTRIBUTION TRANSFORMERS

- A. Comply with NFPA 70, and list and label as complying with UL 1561.
- B. Cores: Electrical grade, non-aging silicon steel with high permeability and low hysteresis losses.
  - 1. One leg per phase.
  - 2. Grounded to enclosure.
- C. Coils: Continuous windings except for taps.
  - 1. Coil Material: Copper.
  - 2. Internal Coil Connections: Brazed or pressure type.
  - 3. Terminal Connections: Bolted.
- A. Encapsulation: Transformers smaller than 15 kVA shall be fully encapsulated type.
- B. Enclosure: Ventilated.
  - 1. NEMA 250, Type 2/3R: Core and coil shall be encapsulated within resin compound to seal out moisture and air.
  - 2. KVA Ratings: Based on convection cooling only and not relying on auxiliary fans.
  - 3. Wiring Compartment: Sized for conduit entry and wiring installation.
  - 4. Finish: Comply with NEMA 250.
    - a. Finish Color: Gray weather-resistant enamel.
- C. Taps for Transformers 15 kVA and Larger: Two 2.5 percent taps above and two 2.5 percent taps below normal full capacity.
- D. Insulation Class, 15 kVA and Larger: 220 deg C, UL-component-recognized insulation system with a maximum of 115 deg C rise above 40 deg C ambient temperature.

- E. Grounding: Provide ground-bar kit or a ground bar installed on the inside of the transformer enclosure.
- F. K-Factor Rating: Transformers indicated to be K-factor rated shall comply with UL 1561 requirements for nonsinusoidal load current-handling capability to the degree defined by designated K-factor.
  - 1. Unit shall not overheat when carrying full-load current with harmonic distortion corresponding to designated K-factor, without exceeding the indicated insulation class in a 40 deg C maximum ambient and a 24-hour average ambient of 30 deg C.
  - 2. Indicate value of K-factor on transformer nameplate.
  - 3. Unit shall comply with requirements of DOE 2016 efficiency levels when tested according to NEMA TP 2 with a K-factor equal to one.
- G. Electrostatic Shielding: Each winding shall have an independent, single, full-width copper electrostatic shield arranged to minimize interwinding capacitance.
  - 1. Arrange coil leads and terminal strips to minimize capacitive coupling between input and output terminals.
  - 2. Include special terminal for grounding the shield.
- H. Neutral: Rated 200 percent of full load current for K-factor-rated transformers.
- I. Low-Sound-Level Requirements: Maximum sound levels when factory tested according to IEEE C57.12.91, as follows:
  - 1. 9.01 to 30.00 kVA: 45 dBA.
  - 2. 30.01 to 50.00 kVA: 45 dBA.
  - 3. 50.01 to 150.00 kVA: 50 dBA.
  - 4. 150.01 to 300.00 kVA: 55 dBA.
  - 5. 300.01 to 500.00 kVA: 60 dBA.

## 2.4 IDENTIFICATION

- A. Nameplates: Engraved, laminated-acrylic or melamine plastic signs for each distribution transformer, mounted with corrosion-resistant screws. Nameplates and label products are specified in Section 260553 "Identification for Electrical Systems."

## 2.5 SOURCE QUALITY CONTROL

- A. Test and inspect transformers according to IEEE C57.12.01 and IEEE C57.12.91.
  - 1. Resistance measurements of all windings at rated voltage connections and at all tap connections.
  - 2. Ratio tests at rated voltage connections and at all tap connections.
  - 3. Phase relation and polarity tests at rated voltage connections.
  - 4. No load losses, and excitation current and rated voltage at rated voltage connections.
  - 5. Impedance and load losses at rated current and rated frequency at rated voltage connections.
  - 6. Applied and induced tensile tests.

7. Regulation and efficiency at rated load and voltage.
8. Insulation-Resistance Tests:
  - a. High-voltage to ground.
  - b. Low-voltage to ground.
  - c. High-voltage to low-voltage.
9. Temperature tests.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine conditions for compliance with enclosure- and ambient-temperature requirements for each transformer.
- B. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.
- C. Examine walls, floors, roofs, and concrete bases for suitable mounting conditions where transformers will be installed.
- D. Verify that ground connections are in place and requirements in Section 260526 "Grounding and Bonding for Electrical Systems" have been met. Maximum ground resistance shall be 5 ohms at location of transformer.
- E. Environment: Enclosures shall be rated for the environment in which they are located. Covers for NEMA 250, Type 4X enclosures shall not cause accessibility problems.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Install wall-mounted transformers level and plumb with wall brackets fabricated by transformer manufacturer.
  1. Coordinate installation of wall-mounted and structure-hanging supports with actual transformer provided.
- B. Install stacked transformers on structural supports fabricated from design drawings signed and sealed by a licensed structural engineer.
  1. Coordinate installation of wall-mounted and rack mounted supports with actual transformer provided.
- C. Install transformers level and plumb on a concrete base. Locate transformers away from corners and not parallel to adjacent wall surface.

- D. Anchor floor-mounted transformers according to manufacturer's written instructions, seismic codes applicable to Project, and requirements in Section 260529 "Hangers and Supports for Electrical Systems."
- E. Secure transformer to concrete base according to manufacturer's written instructions.
- F. Secure covers to enclosure and tighten all bolts to manufacturer-recommended torques to reduce noise generation.
- G. Remove shipping bolts, blocking, and wedges.

### 3.3 CONNECTIONS

- A. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- C. 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-486B.
- D. Provide flexible connections at all conduit and conductor terminations and supports to eliminate sound and vibration transmission to the building structure.

### 3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Small (Up to 167-kVA Single-Phase or 500-kVA Three-Phase) Dry-Type Transformer Field Tests:
  - 1. Visual and Mechanical Inspection.
    - a. Inspect physical and mechanical condition.
    - b. Inspect anchorage, alignment, and grounding.
    - c. Verify that resilient mounts are free and that any shipping brackets have been removed.
    - d. Verify the unit is clean.
    - e. Perform specific inspections and mechanical tests recommended by manufacturer.
    - f. Verify that as-left tap connections are as specified.
    - g. Verify the presence of surge arresters and that their ratings are as specified.
  - 2. Electrical Tests:
    - a. Measure resistance at each winding, tap, and bolted connection.
    - b. Perform insulation-resistance tests winding-to-winding and each winding-to-ground. Apply voltage according to manufacturer's published data. In the absence

of manufacturer's published data, comply with NETA ATS, Table 100.5. Calculate polarization index: the value of the index shall not be less than 1.0.

- c. Perform turns-ratio tests at all tap positions. Test results shall not deviate by more than one-half percent from either the adjacent coils or the calculated ratio. If test fails, replace the transformer.
- d. Verify correct secondary voltage, phase-to-phase and phase-to-neutral, after energization and prior to loading.

- C. Remove and replace units that do not pass tests or inspections and retest as specified above.

### 3.5 ADJUSTING

- A. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 5 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.
- B. Output Settings Report: Prepare a written report recording output voltages and tap settings.

### 3.6 CLEANING

- A. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

END OF SECTION

## 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. Section Includes:
  - 1. Service and distribution switchboards rated 600 V and less.
  - 2. Surge protection devices.
  - 3. Disconnecting and overcurrent protective devices.
  - 4. Instrumentation.
  - 5. Accessory components and features.
  - 6. Identification.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each switchboard, overcurrent protective device, surge protection device, ground-fault protector, accessory, and component.
  - 1. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
- B. Shop Drawings: For each switchboard and related equipment.
  - 1. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings.
  - 2. Detail enclosure types for types other than NEMA 250, Type 1.
  - 3. Detail bus configuration, current, and voltage ratings.
  - 4. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
  - 5. Detail short-circuit current rating of switchboards and overcurrent protective devices.

### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For switchboards and components to include in emergency, operation, and maintenance manuals.
  - 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
    - a. Routine maintenance requirements for switchboards and all installed components.
    - b. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver switchboards in sections or lengths that can be moved past obstructions in delivery path.
- B. Remove loose packing and flammable materials from inside switchboards.
- C. Handle and prepare switchboards for installation according to NECA 400.

## 1.6 FIELD CONDITIONS

- A. Environmental Limitations:
  - 1. Do not deliver or install switchboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above switchboards is complete, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
  - 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
    - a. Ambient Temperature: Not exceeding 104 deg F (40 deg C).
    - b. Altitude: Not exceeding 6600 feet (2000 m).

## 1.7 COORDINATION

- A. Coordinate layout and installation of switchboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

## 1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace switchboard enclosures, buswork, overcurrent protective devices, accessories, and factory installed interconnection wiring that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: 12 months from date of Substantial Completion.
- B. Manufacturer's Warranty: Manufacturer's agrees to repair or replace surge protection devices that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 SWITCHBOARDS

- A. Source Limitations: Obtain switchboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with NEMA PB 2.
- D. Comply with NFPA 70.
- E. Comply with UL 891.
- F. Front-Connected, Front-Accessible Switchboards:
  - 1. Main Devices: Fixed, individually mounted.
  - 2. Branch Devices: Panel mounted.
  - 3. Sections front and rear aligned.
- G. Nominal System Voltage: 480Y/277 V or 208Y/120 V as indicated.
- H. Main-Bus Continuous: As indicated.
- I. Indoor Enclosures: Steel, NEMA 250, Type 1.
- J. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer's standard gray finish over a rust-inhibiting primer on treated metal surface.
- K. Barriers: Between adjacent switchboard sections.
- L. Service Entrance Rating: Switchboards intended for use as service entrance equipment shall contain from one to six service disconnecting means with overcurrent protection, a neutral bus with disconnecting link, a grounding electrode conductor terminal, and a main bonding jumper.
- M. Bus Transition and Incoming Pull Sections: Matched and aligned with basic switchboard.
- N. Buses and Connections: Three phase, four wire unless otherwise indicated.
  - 1. Provide phase bus arrangement A, B, C from front to back, top to bottom, and left to right when viewed from the front of the switchboard.
  - 2. Phase- and Neutral-Bus Material: Hard-drawn copper of 98 percent conductivity.
  - 3. Copper feeder circuit-breaker line connections.
  - 4. Ground Bus: Minimum-size required by UL 891, hard-drawn copper of 98 percent conductivity, equipped with mechanical connectors for feeder and branch-circuit ground conductors.
  - 5. Main-Phase Buses and Equipment-Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections. Provide for future extensions from both ends.
  - 6. Disconnect Links:
    - a. Isolate neutral bus from incoming neutral conductors.
    - b. Bond neutral bus to equipment-ground bus for switchboards utilized as service equipment or separately derived systems.
  - 7. Neutral Buses: 100 percent of the ampacity of phase buses unless otherwise indicated, equipped with mechanical connectors for outgoing circuit neutral cables. Brace bus extensions for busway feeder neutral bus.
- O. Future Devices: Equip compartments with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit-breaker compartment.

## 2.2 SURGE PROTECTION DEVICES

- A. SPDs: Comply with UL 1449, Type 1.
- B. Features and Accessories:
  - 1. Integral disconnect switch.
  - 2. Indicator light display for protection status.
  - 3. Surge counter.
- C. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase shall not be less than 300kA. The peak surge current rating shall be the arithmetic sum of the ratings of the individual MOVs in a given mode.
- D. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277 V or 208Y/120 V three-phase, four-wire circuits shall not exceed the following:
  - 1. Line to Neutral: 1200 V for 480Y/277 V, 700 V for 208Y/120 V.
  - 2. Line to Ground: 1200 V for 480Y/277 V, 1200 V for 208Y/120 V.
  - 3. Line to Line: 2000 V for 480Y/277 V, 1000 V for 208Y/120 V.
- E. SCCR: Equal or exceed 200 kA.
- F. Nominal Rating: 20 kA.

## 2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
  - 1. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
  - 2. Electronic trip circuit breakers with rms sensing for all breakers 400A and larger; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:
    - a. Instantaneous trip.
    - b. Long- and short-time pickup levels.
    - c. Long and short time adjustments.
    - d. Ground-fault pickup level, time delay, and I squared t response where indicated on schedules.
  - 3. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (5-mA trip).
  - 4. MCCB Features and Accessories:
    - a. Standard frame sizes, trip ratings, and number of poles.
    - b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor material.
    - c. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator where indicated in schedules.
- B. Insulated-Case Circuit Breaker (ICCB) (required for all breakers 1000A and larger): 80 percent rated, sealed, insulated-case power circuit breaker with interrupting capacity rating to meet available fault current.

1. Fixed circuit-breaker mounting.
2. Two-step, stored-energy closing.
3. Standard-function, microprocessor-based trip units with interchangeable rating plug, trip indicators, and the following field-adjustable settings:
  - a. Instantaneous trip.
  - b. Long- and short-time pickup levels.
  - c. Long and short time adjustments.
  - d. Ground-fault pickup level, time delay, and I squared t response where indicated in schedules.

- C. Furnish and install lockable handles for all breakers 400A and larger.

## 2.4 IDENTIFICATION

- A. Service Equipment Label: NRTL labeled for use as service equipment for switchboards with one or more service disconnecting and overcurrent protective devices.

## 2.5 INSTRUMENTATION

- A. Multifunction Digital-Metering Monitor: Microprocessor-based unit suitable for three- or four-wire systems and with the following features:
  1. Switch-selectable digital display of the following values with maximum accuracy tolerances as indicated:
    - a. Phase Currents, Each Phase: Plus or minus 0.5 percent.
    - b. Phase-to-Phase Voltages, Three Phase: Plus or minus 0.5 percent.
    - c. Phase-to-Neutral Voltages, Three Phase: Plus or minus 0.5 percent.
    - d. Megawatts: Plus or minus 1 percent.
    - e. Megavars: Plus or minus 1 percent.
    - f. Power Factor: Plus or minus 1 percent.
    - g. Frequency: Plus or minus 0.1 percent.
    - h. Accumulated Energy, Megawatt Hours: Plus or minus 1 percent; accumulated values unaffected by power outages up to 72 hours.
  2. Mounting: Display and control unit flush or semiflush mounted in instrument compartment door.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Receive, inspect, handle, and store switchboards according to NECA 400.
  1. Lift or move panelboards with spreader bars and manufacturer-supplied lifting straps following manufacturer's instructions.
  2. Use rollers, slings, or other manufacturer-approved methods if lifting straps are not furnished.
  3. Protect from moisture, dust, dirt, and debris during storage and installation.
  4. Install temporary heating during storage per manufacturer's instructions.

- B. Examine switchboards before installation. Reject switchboards that are moisture damaged or physically damaged.
- C. Examine elements and surfaces to receive switchboards for compliance with installation tolerances and other conditions affecting performance of the Work or that affect the performance of the equipment.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install switchboards and accessories according to NECA 400.
- B. Equipment Mounting: Install switchboards on concrete base, 4-inch (100-mm) nominal thickness. Comply with requirements for concrete base specified in Section 033000 "Cast-in-Place Concrete."
  - 1. Install conduits entering underneath the switchboard, entering under the vertical section where the conductors will terminate. Install with couplings flush with the concrete base. Extend 2 inches (50-mm) above concrete base after switchboard is anchored in place.
  - 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
  - 3. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
  - 4. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 5. Install anchor bolts to elevations required for proper attachment to switchboards.
  - 6. Anchor switchboard to building structure at the top of the switchboard if required or recommended by the manufacturer.
- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, straps and brackets, and temporary blocking of moving parts from switchboard units and components.
- D. Install filler plates in unused spaces of panel-mounted sections.
- E. Install overcurrent protective devices, surge protection devices, and instrumentation.
  - 1. Set field-adjustable switches and circuit-breaker trip ranges.
- F. Comply with NECA 1.

### 3.3 CONNECTIONS

- A. Bond conduits entering underneath the switchboard to the equipment ground bus with a bonding conductor sized per NFPA 70.
- B. Support and secure conductors within the switchboard according to NFPA 70.
- C. All feeders leaving the switchboard shall be underground.

### 3.4 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- B. Switchboard Nameplates: Label each switchboard compartment with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- C. Device Nameplates: Label each disconnecting and overcurrent protective device and each meter and control device mounted in compartment doors with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

### 3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
  - 1. Acceptance Testing:
    - a. Test insulation resistance for each switchboard bus, component, connecting supply, feeder, and control circuit. Open control and metering circuits within the switchboard and remove neutral connection to surge protection and other electronic devices prior to insulation test. Reconnect after test.
    - b. Test continuity of each circuit.
  - 2. Test ground-fault protection of equipment for service equipment per NFPA 70.
  - 3. Test the arc-energy reduction mechanism where required for breakers per NFPA 70.
  - 4. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
  - 5. Correct malfunctioning units on-site where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- C. Switchboard will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports, including a certified report that identifies switchboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

### 3.6 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges as specified in Section 260573.16 "Coordination Studies."



## 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. Section Includes:
  - 1. Distribution panelboards.
  - 2. Lighting and appliance branch-circuit panelboards.

### 1.3 DEFINITIONS

- A. ATS: Acceptance testing specification.
- B. GFCI: Ground-fault circuit interrupter.
- C. HID: High-intensity discharge.
- D. MCCB: Molded-case circuit breaker.
- E. SPD: Surge protective device.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of panelboard.
  - 1. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
  - 2. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
  - 1. Include dimensioned plans, elevations, sections, and details.
  - 2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
  - 3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
  - 4. Detail bus configuration, current, and voltage ratings.
  - 5. Short-circuit current rating of panelboards and overcurrent protective devices.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Remove loose packing and flammable materials from inside panelboards.
- B. Handle and prepare panelboards for installation according to NECA 407.

### 1.6 FIELD CONDITIONS

- A. Environmental Limitations:
  - 1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
  - 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
    - a. Ambient Temperature: Not exceeding minus 22 deg F (minus 30 deg C) to plus 104 deg F (plus 40 deg C).
    - b. Altitude: Not exceeding 6600 feet (2000 m).

### 1.7 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.
  - 1. Panelboard Warranty Period: 18 months from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PANELBOARDS COMMON REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NEMA PB 1.
- C. Comply with NFPA 70.
- D. Enclosures: Flush or Surface as indicated-mounted, dead-front cabinets.
  - 1. Rated for environmental conditions at installed location.
    - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
    - b. Outdoor Locations: NEMA 250, Type 3R.
  - 2. Height: 84 inches (2.13 m) maximum.

3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.
  4. Finishes:
    - a. Panels and Trim: Steel and galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
    - b. Back Boxes: Galvanized steel
- E. Incoming Mains:
1. Location: Top or Bottom as indicated.
- F. Phase, Neutral, and Ground Buses:
1. Material: Hard-drawn copper, 98 percent conductivity.
    - a. Plating shall run entire length of bus.
    - b. Bus shall be fully rated the entire length.
  2. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.
  3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
  4. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.
- G. Conductor Connectors: Suitable for use with conductor material and sizes.
1. Material: Hard-drawn copper, 98 percent conductivity.
  2. Terminations shall allow use of 75 deg C rated conductors without derating.
  3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
  4. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
  5. Ground Lugs and Bus-Configured Terminators: Compression type, with a lug on the bar for each pole in the panelboard.
- H. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.
1. Panelboards and overcurrent protective devices rated 240 V or less shall have short-circuit ratings as shown on Drawings, but not less than 10,000 A rms symmetrical.
  2. Panelboards and overcurrent protective devices rated above 240 V and less than 600 V shall have short-circuit ratings as shown on Drawings, but not less than 14,000 A rms symmetrical.

## 2.2 POWER PANELBOARDS

- A. Panelboards: NEMA PB 1, distribution type.
- B. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
  - 1. For doors more than 36 inches (914 mm) high, provide two latches, keyed alike.
- C. Mains: Circuit breaker or Lugs only as indicated.
- D. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
- E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers.

## 2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- B. Mains: Circuit breaker or lugs only as indicated.
- C. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- D. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.
- E. Doors: Door-in-door construction with concealed hinges; secured with multipoint latch with tumbler lock; keyed alike. Outer door shall permit full access to the panel interior. Inner door shall permit access to breaker operating handles and labeling, but current carrying terminals and bus shall remain concealed.

## 2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.
  - 1. Thermal-Magnetic Circuit Breakers:
    - a. Inverse time-current element for low-level overloads.
    - b. Instantaneous magnetic trip element for short circuits.
    - c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
  - 2. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
  - 3. MCCB Features and Accessories:
    - a. Standard frame sizes, trip ratings, and number of poles.
    - b. Breaker handle indicates tripped status.
    - c. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.

- d. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.
- e. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.
- f. Multipole units enclosed in a single housing with a single handle.

## 2.5 IDENTIFICATION

- A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.
- B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.
- C. Circuit Directory: Computer-generated circuit directory mounted inside panelboard door with transparent plastic protective cover.
  - 1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.
- B. Receive, inspect, handle, and store panelboards according to NECA 407.
- C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.
- D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Comply with NECA 1.

- C. Install panelboards and accessories according to NECA 407.
- D. Equipment Mounting:
  - 1. Attach panelboard to the vertical finished or structural surface behind the panelboard.
- E. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
- F. Mount top of trim 90 inches (2286 mm) above finished floor unless otherwise indicated. Distance to highest breaker shall not exceed 6'7" from finished floor.
- G. Mount panelboard cabinet plumb and rigid without distortion of box.
- H. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- I. Mount surface-mounted panelboards to steel slotted supports 5/8 inch (16 mm) in depth. Orient steel slotted supports vertically.
- J. Install overcurrent protective devices and controllers not already factory installed.
  - 1. Set field-adjustable, circuit-breaker trip ranges.
  - 2. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.
- K. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.
- L. Install filler plates in unused spaces.

### 3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

### 3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers stated in NETA ATS, Paragraph 7.6 Circuit Breakers. Do not perform optional tests. Certify compliance with test parameters
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Panelboards will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

### 3.5 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

### 3.6 PROTECTION

- A. Temporary Heating: Prior to energizing panelboards, apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION



## 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. Section Includes:
  1. Standard-grade receptacles, 125 V, 20 A.
  2. GFCI receptacles, 125 V, 20 A.
  3. Toggle switches, 120/277 V, 20 A.
  4. Occupancy sensors.
  5. Wall plates.

### 1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

## PART 2 - PRODUCTS

### 2.1 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Comply with NFPA 70.
- C. RoHS compliant.
- D. Comply with NEMA WD 1.
- E. Device Color:

1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.

F. Wall Plate Color: For plastic covers, match device color.

G. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

## 2.2 STANDARD-GRADE RECEPTACLES, 125 V, 20 A

A. Duplex Receptacles, 125 V, 20 A:

1. Description: Two pole, three wire, and self-grounding.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498 and FS W-C-596.

B. Tamper-Resistant Duplex Receptacles, 125 V, 20 A:

1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498 and FS W-C-596.
4. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.

C. Weather-Resistant Duplex Receptacle, 125 V, 20 A :

1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498.
4. Marking: Listed and labeled as complying with NFPA 70, "Receptacles in Damp or Wet Locations" Article.

D. Tamper- and Weather-Resistant Duplex Receptacles, 125 V, 20 A:

1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498.
4. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" and "Receptacles in Damp or Wet Locations" articles.

## 2.3 GFCI RECEPTACLES, 125 V, 20 A

A. Duplex GFCI Receptacles, 125 V, 20 A:

1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Type: Non-feed through.
4. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.

B. Tamper-Resistant Duplex GFCI Receptacles, 125 V, 20 A:

1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
  2. Configuration: NEMA WD 6, Configuration 5-20R.
  3. Type: Non-feed through.
  4. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.
  5. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.
- C. Tamper- and Weather-Resistant, GFCI Duplex Receptacles, 125 V, 20 A:
1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
  2. Configuration: NEMA WD 6, Configuration 5-15R.
  3. Type: Non-feed through.
  4. Standards: Comply with UL 498 and UL 943 Class A.
  5. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" and "Receptacles in Damp or Wet Locations" articles.

## 2.4 OCCUPANCY SENSORS

- A. Wall Switch Sensor Light Switch, Dual Technology:
1. Description: Switchbox-mounted, combination lighting-control sensor and conventional switch lighting-control unit using dual (ultrasonic and passive infrared) technology.
  2. Standards: Comply with UL 20.
  3. Rated 960 W at 120 V ac for tungsten lighting, 10 A at 120 V ac or 10 A at 277 V ac for fluorescent or LED lighting, and 1/4 hp at 120 V ac.
  4. Adjustable time delay of 15 minutes.
  5. Able to be locked to Manual-On mode.
  6. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc (21.5 to 2152 lux).

## 2.5 SWITCHES

- A. TOGGLE TYPE
1. Switches shall be toggle, quiet-type with totally enclosed bodies of thermoplastic and mounting strap.
  2. Rated for 20A, 277 volts AC. Specification grade.

## 2.6 WALL PLATES

- A. Single Source: Obtain wall plates from same manufacturer of wiring devices.
- B. Single and combination types shall match corresponding wiring devices.
1. Plate-Securing Screws: Metal with head color to match plate finish.
  2. Material for finished and unfinished Spaces: 0.035-inch- (1-mm-) thick, satin-finished, Type 302 stainless steel.

- C. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
  - 1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes, and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
  - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
  - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
  - 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
  - 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
  - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
  - 3. The length of free conductors at outlets for devices shall comply with NFPA 70, Article 300, without pigtails.
  - 4. Existing Conductors:
    - a. Cut back and pigtail, or replace all damaged conductors.
    - b. Straighten conductors that remain and remove corrosion and foreign matter.
- D. Device Installation:
  - 1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
  - 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
  - 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
  - 4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
  - 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
  - 6. Use a torque screwdriver when a torque is recommended or required by manufacturer.

7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

H. Adjust locations of floor service outlets to suit arrangement of furnishings.

### 3.2 FIELD QUALITY CONTROL

A. Test Instruments: Use instruments that comply with UL 1436.

B. Test Instrument for Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

C. Tests for Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault-current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

D. Wiring device will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

END OF SECTION



## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:
  - 1. Fusible switches.
  - 2. Nonfusible switches.
  - 3. Molded-case circuit breakers (MCCBs).
  - 4. Enclosures.

### 1.3 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
  - 1. Enclosure types and details for types other than NEMA 250, Type 1.
  - 2. Current and voltage ratings.
  - 3. Short-circuit current ratings (interrupting and withstand, as appropriate).
  - 4. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
  - 5. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

### 1.5 FIELD CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).
2. Altitude: Not exceeding 6600 feet (2010 m).

## 1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.
  1. Warranty Period: One year(s) from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 GENERAL REQUIREMENTS

- A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- C. Comply with NFPA 70.

### 2.2 FUSIBLE SWITCHES

- A. Type HD, Heavy Duty:
  1. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses.
  2. Lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- B. Accessories:
  1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
  2. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
  3. Lugs: Mechanical type, suitable for number, size, and conductor material.

### 2.3 NONFUSIBLE SWITCHES

- A. Type HD, Heavy Duty, Three Pole, Single Throw, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- B. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground
2. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.

#### 2.4 MOLDED-CASE CIRCUIT BREAKERS

- A. Circuit breakers shall be constructed using glass-reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.
- B. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center, be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes.
- C. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker. Circuit breakers shall be 100 percent rated.
- D. MCCBs shall be equipped with a device for locking in the isolated position.
- E. Lugs shall be suitable for 140 deg F (60 deg C) rated wire on 125-A circuit breakers and below.
- F. Standard: Comply with UL 489 with interrupting capacity to comply with available fault currents.
- G. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- H. Features and Accessories:
  1. Standard frame sizes, trip ratings, and number of poles.
  2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
  3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.

#### 2.5 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
- B. Enclosure Finish: The enclosure shall be gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (NEMA 250 Type 1).

- C. Operating Mechanism: The circuit-breaker operating handle shall be externally operable with the operating mechanism being an integral part of the box, not the cover. The cover interlock mechanism shall have an externally operated override. The override shall not permanently disable the interlock mechanism, which shall return to the locked position once the override is released. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
  - 1. Commencement of work shall indicate Installer's acceptance of the areas and conditions as satisfactory.

#### 3.2 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

- A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.
  - 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
  - 2. Outdoor Locations: NEMA 250, Type 3R.
  - 3. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
  - 4. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

#### 3.3 INSTALLATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- C. Install fuses in fusible devices.
- D. Comply with NFPA 70 and NECA 1.

### 3.4 IDENTIFICATION

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems."

### 3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections for Switches:
  - 1. Visual and Mechanical Inspection:
    - a. Inspect physical and mechanical condition.
    - b. Inspect anchorage, alignment, grounding, and clearances.
    - c. Verify that the unit is clean.
    - d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
    - e. Verify that fuse sizes and types match the Specifications and Drawings.
    - f. Verify that each fuse has adequate mechanical support and contact integrity.
    - g. Inspect bolted electrical connections for high resistance using one of the two following methods:
      - 1) Use a low-resistance ohmmeter.
        - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
      - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
        - a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
    - h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on the Drawings.
    - i. Verify correct phase barrier installation.
    - j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.
- C. Tests and Inspections for Molded Case Circuit Breakers:
  - 1. Visual and Mechanical Inspection:
    - a. Verify that equipment nameplate data are as described in the Specifications and shown on the Drawings.
    - b. Inspect physical and mechanical condition.
    - c. Inspect anchorage, alignment, grounding, and clearances.

- d. Verify that the unit is clean.
- e. Operate the circuit breaker to ensure smooth operation.
- f. Inspect bolted electrical connections for high resistance using one of the two following methods:
  - 1) Use a low-resistance ohmmeter.
    - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
  - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
    - a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
- g. Inspect operating mechanism, contacts, and chutes in unsealed units.
- 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

### 3.6 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION

## 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. Section includes field-mounted SPDs for low-voltage (120 to 600 V) power distribution and control equipment.

### 1.3 DEFINITIONS

- A. Inominal: Nominal discharge current.
- B. MCOV: Maximum continuous operating voltage.
- C. Mode(s), also Modes of Protection: The pair of electrical connections where the VPR applies.
- D. MOV: Metal-oxide varistor; an electronic component with a significant non-ohmic current-voltage characteristic.
- E. OCPD: Overcurrent protective device.
- F. SCCR: Short-circuit current rating.
- G. SPD: Surge protective device.
- H. VPR: Voltage protection rating.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
  - 2. Copy of UL Category Code VZCA certification, as a minimum, listing the tested values for VPRs, Inominal ratings, MCOVs, type designations, OCPD requirements, model numbers, system voltages, and modes of protection.

### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For SPDs to include in maintenance manuals.

## 1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace SPDs that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 GENERAL SPD REQUIREMENTS

- A. SPD with Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Comply with UL 1449.
- D. MCOV of the SPD shall be the nominal system voltage.

### 2.2 SERVICE ENTRANCE SUPPRESSOR

- A. SPDs: Comply with UL 1449, Type 1.
- B. SPDs: Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1449, Type 1
  - 1. SPDs with the following features and accessories:
    - a. Integral disconnect switch.
    - b. Internal thermal protection that disconnects the SPD before damaging internal suppressor components.
    - c. Indicator light display for protection status.
    - d. Surge counter.
- C. Comply with UL 1283.
- D. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase shall not be less than 200 kA. The peak surge current rating shall be the arithmetic sum of the ratings of the individual MOVs in a given mode.
- E. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277 V or 208Y/120 V as indicated, three-phase, four-wire circuits shall not exceed the following:
  - 1. Line to Neutral: 1200 V for 480Y/277 V; 700 V for 208Y/120 V.
  - 2. Line to Ground: 1200 V for 480Y/277 V; 1200 V for 208Y/120 V.
  - 3. Line to Line: 2000 V for 480Y/277 V, 1000 V for 208Y/120 V.

F. SCCR: Equal or exceed 200 kA.

G. Inominal Rating: 20 kA.

## 2.3 PANEL SUPPRESSORS

A. SPDs: Comply with UL 1449, Type 2.

1. Include LED indicator lights for power and protection status.
2. Internal thermal protection that disconnects the SPD before damaging internal suppressor components.

B. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase shall be not less than 100 kA. The peak surge current rating shall be the arithmetic sum of the ratings of the individual MOVs in a given mode.

C. Comply with UL 1283.

D. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277 V or 208Y/120 V as indicated, three-phase, four-wire circuits shall not exceed the following:

1. Line to Neutral: 1200 V for 480Y/277 V; 700 V for 208Y/120 V.
2. Line to Ground: 1200 V for 480Y/277 V; 700 V for 208Y/120 V
3. Neutral to Ground: 1200 V for 480Y/277 V; 700 V for 208Y/120 V
4. Line to Line: 2000 V for 480Y/277 V; 1200 V for 208Y/120 V

E. SCCR: Equal or exceed 200 kA.

F. Inominal Rating: 20 kA.

## 2.4 ENCLOSURES

A. Indoor Enclosures: NEMA 250, Type 1.

B. Outdoor Enclosures: NEMA 250, Type 3R.

## 2.5 CONDUCTORS AND CABLES

A. Power Wiring: Same size as SPD leads, complying with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. Comply with NECA 1.

- B. Install an OCPD or disconnect as required to comply with the UL listing of the SPD.
- C. Install SPDs with conductors between suppressor and points of attachment as short and straight as possible, and adjust circuit-breaker positions to achieve shortest and straightest leads. Do not splice and extend SPD leads unless specifically permitted by manufacturer. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground.
- D. Use crimped connectors and splices only. Wire nuts are unacceptable.
- E. Wiring:
  - 1. Power Wiring: Comply with wiring methods in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

### 3.2 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative.
  - 1. Compare equipment nameplate data for compliance with Drawings and Specifications.
  - 2. Inspect anchorage, alignment, grounding, and clearances.
  - 3. Verify that electrical wiring installation complies with manufacturer's written installation requirements.
- B. An SPD will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 264313

## PART 1 GENERAL

### 1.01 SUMMARY

- A. If testing proves that system is required; furnish, install, and test a complete and operating Emergency Responder Radio Antenna/Repeater System. The system will support only the Fire Department radio system and no others. Provisions for supporting other public safety systems (e.g. police); cell phone carriers.
- B. This Section includes the requirements for an Emergency Responder Radio Antenna/Repeater System for the purposes of amplifying Emergency Responder radio signals to achieve minimum signal strength in 95% of all areas on each floor of the building.
- C. Final acceptance and approval is required from the local Fire Department in writing prior to contract closeout.
- D. Section Includes:
  - 1. Bi-directional amplifiers (BDA's)
  - 2. Distributed Antenna System (DAS)
  - 3. Coaxial cables
  - 4. Splitters and direction couplers
  - 5. UPS
  - 6. All other equipment and components necessary for a complete and functioning Emergency Responder Radio Antenna/Repeater System.

### 1.02 REGULATIONS

- A. Codes, regulations, and standards referenced in the Section are:
  - 1. NFPA 1 – The National Fire Code
  - 2. NFPA 70 – The National Electrical Code
  - 3. NFPA 101, Life Safety Code, and Local Code and Building Authority requirements.
  - 4. NFPA 72 National Fire Alarm Code
  - 5. FCC 47 CFR Private Land Mobile Radio
    - a. 90.219-2007 Services-Use of Signal Boosters
  - 6. International Fire Code, Code and Commentary
  - 7. ADA "Americans with Disabilities Act"
  - 8. FCC's OET 65 Standards "Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields".
  - 9. FCC Rules Part 22, Part 90 and Part 101.

### 1.03 DEFINITIONS

- A. Definitions:
  - 1. Bi-Directional Amplifier (BDA): Device used to amplify band-selective or multi-band RF signals in the uplink, to the base station for enhanced signals and improved coverage.
  - 2. Emergency Responder Radio Coverage System (ERRCS): A two-way radio communication system installed to assure the effective operation of radio communications systems for fire, emergency medical services or law enforcement agencies within a building or structure. A system used by firefighters, police, and other emergency services personnel.
  - 3. Delivered Audio Quality Definitions (DAQ): This is a universal standard often cited in system designs and specifications.
    - a. DAQ 1: Unusable, speech present but unreadable.
    - b. DAQ 2: Understandable with considerable effort. Frequent repetition due to noise/distortion.
    - c. DAQ 3: Speech understandable with slight effort. Occasional repetition required due to noise/distortion.

- d. DAQ 3.5: Speech understandable with repetition only rarely required. Some noise/distortion
- e. DAQ 4: Speech easily understood. Occasional noise/distortion.
- f. DAQ 4.5: Speech easily understood. Infrequent noise/distortion.
- g. DAQ 5: Speech easily understood. Coupled Bonding Conductor (CBC) – The term "Coupled Bonding Conductor" shall mean a bonding conductor placed, e.g. strapped, on the outside of any technology cable, used to suppress transient noise.
- 4. FCC: Federal Communications Commission
- 5. OET 65 Standards: FCC's Bulletin 65 provides Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.
- 6. Public Safety/First Responder: Public Safety or First Responder agencies which are charged with the responsibility of responding to emergency situations. These include, but are not limited to: law enforcement departments, fire departments, and emergency medical companies.

#### 1.04 SUBMITTALS

- A. Submit product data for each type of proposed system component specified, including dimensioned drawings showing minimum clearances and installed features.
- B. Layout Drawings
  - 1. Component specification sheets shall be 8.5 inch x 11 inch or greater, scaled or dimensioned, with dimensions or scale clearly noted.
  - 2. Floor plan drawings shall be 24 inch x 36 inch minimum with drawings scaled to legible size.
  - 3. Floor plan drawings may include elevation detail names for each elevation view. Sheet title shall include site name, address, sheet number, floor plan number and north arrow. Include site plan view of the subject buildings and surrounding property to clearly indicate the location and orientation of roof mounted outdoor antennas associated with the proposed system.
  - 4. Include a minimum of (1) building elevation depicting the location of any outdoor antennas associated with the proposed system. Include height of antenna centerline above building, orientation, and location of all external grounding connections.
  - 5. Include a detail plan view of all Telecommunications Spaces housing head-end and/or other consolidated equipment, showing the location of the rack(s) and/or enclosure(s) of the Emergency Responder Radio Antenna/Repeater System equipment.
  - 6. Include a separate plan view of each interior floor where indoor antenna systems are proposed. Include antenna numbers, coaxial cable routes, and the locations of any other system components including splitters, couplers, filters, amplifiers, etc. All components shall be named or labeled for reference in power budget calculations tables. Overlay approximated coverage radii indicating –95 dBm downlink (base to mobile) signal strength around each proposed indoor coverage antenna. Include results of any previous coverage testing per grid, if available.
  - 7. Include a minimum of one (1) detail elevation view(s) of all rack(s) and/or enclosure(s) housing the Emergency Responder Radio Antenna/Repeater System equipment. Identify each piece of equipment by brand, model number and equipment type.
  - 8. Specify antenna grounding and surge protection in accordance with NEC Article 810.
  - 9. Specify the backup power source (Life Safety), and include calculations to ensure the backup power requirements as specified in this standard are met.
- C. Equipment Specification Sheets
  - 1. Provide copies of manufacturer specification sheets of all system components, including:
    - a. Amplifiers
    - b. Antennas
    - c. Coaxial cable, couplers, splitters, combiners, or other passive components
  - 2. Operation and maintenance data

3. Pass band curves in for the uplink and downlink portions of the NPSPAC band for any amplifiers, if not included in #1. Amplifiers may NOT amplify portions of other licensed services, including Nextel and Specialized Mobile Radio Licensee band, or Cellular A or B bands.
  4. Backup battery and charging system.
- D. Submit wiring diagrams from manufacturer differentiating clearly between factory and field-installed wiring. Include diagrams for each component of the system with all terminals and interconnections identified. Make all diagrams specific to this Project.
- E. Submit product certificates signed by the manufacturer of radio system components certifying that their products comply with specified requirements.
- F. Submit agenda for training class and copies of all handouts for the class.
- G. Maintenance data for radio system shall be included in the operation and maintenance manual. Include data for each type of product, including all features and operating sequences, both automatic and manual. Provide the names, addresses, and telephone numbers of service organizations that carry stock of repair parts for the system to be furnished.
- H. Record of field tests of the radio system shall be included in the operation and maintenance manuals.
- I. Design Approval: Plans shall be submitted and approved prior to installation. The following information shall be provided to the local Fire Department unit representative by the system designer/Contractor:
1. A minimum of three (3) copies of detailed drawings showing the location of the amplification equipment and associated antenna systems which includes a view showing building access to the equipment; and
  2. A minimum of three (3) copies of schematic drawings of the electrical system, backup power, antenna system and any other associated equipment relative to the amplification equipment including panel locations and labeling.
  3. A minimum of one (1) copy of the Manufacturer's data sheets on all equipment to be installed.
- 1.05 QUALITY ASSURANCE
- A. Installer Qualifications: Engage an experienced factory-authorized installer to perform work of this Section.
- B. Single-Source Responsibility: Obtain radio system components from a single source who assumes responsibility for compatibility of system components.
- C. All equipment shall be UL listed and labeled, and in accordance with applicable NEMA and ANSI Standards. Where copper cabling is routed to an area, either in another building, or with a separate electrical service, the Technology Contractor shall provide primary protective equipment.
- D. All racks and enclosures shall be either welded or assembled with paint piercing ground washers, grounding strip and bonding jumper as indicated on the Drawings.

## PART 2 PRODUCTS

### 2.01 GENERAL PERFORMANCE REQUIREMENTS

- A. Compatibility: The equipment, including but not limited to repeaters, transmitters, receivers, signal boosters, cabling, fiber distributed antenna system, etc., shall not interfere with the existing communication systems utilized by the Public Safety and First Responder agencies.

- B. Power Supplies: At least two (2) independent and reliable power supplies shall be provided, one primary and one secondary. The primary power source shall be supplied from a dedicated 20 ampere branch circuit and comply with 4.4.1.4 of NFPA 72. The secondary power source shall be a dedicated battery, capable of operating the in-building radio system for at least 12 hours of 100% system operation. The battery system shall automatically charge in the presence of external power input. The battery system shall be contained in one NEMA 4 or 4X type enclosures. Monitoring the integrity of power supplies shall be in accordance with 4.4.7.3 of NFPA 72.
- C. Survivability
  - 1. Physical Protection: All wiring and fiber optics shall be installed in conduit.
  - 2. Fire Performance: All main risers or trunks of the antenna system shall be installed with resistance to attack from a fire using one of the following methods:
    - a. A 2-hour fire rated cable or cable system.
    - b. Routing the cable through a 2-hour fire rated enclosure(s) or shaft(s).
    - c. A system configured in a looped design, routed through 1-hour fire rated enclosure(s) or shaft(s). The circuit shall be capable of transmitting and receiving a signal during a single open or non-simultaneous single ground fault on a circuit conductor.
    - d. Performance alternative approved by the authority having jurisdiction.
  - 3. Cabinet: The signal booster and all associated RF filters shall be housed in a single, NEMA 4 certified, painted steel weather tight box. The cabinet shall be large enough to dissipate internal heat without venting the inside of the cabinet to the outside atmosphere. Operating temperatures: – 22 degrees F to +120 degrees F (–30 degrees C to +50 degrees C) minimum temperature range, including microprocessors. Equipment installed on the roof of structures shall be rated for the expected extreme temperatures associated with rooftop installations.
  - 4. Passive Equipment: Passband shall be 700-900 MHz, IP rating of 2 GHz.
  - 5. Cable: Passband shall be 700-900 MHz. Cable shall be rated for fire plenum and riser rating.

## 2.02 SYSTEM COMPONENTS

- A. Signal Strength
  - 1. Downlink: A minimum signal strength of -95 dBm shall be provided throughout the coverage area.
  - 2. Uplink: Minimum signal strength of -95 dBm received at the local Fire Department Radio System from the coverage area.
  - 3. A donor antenna must maintain isolation from the distributed antenna system. The donor antenna signal level shall be a minimum of 15 dB above the distributed antenna system under all operating conditions.
- B. Permissible Systems
  - 1. Buildings and structures shall be equipped with an FCC Certificated Class B Bi-Directional UHF Amplifier(s) as needed.
  - 2. The distributed antenna system may utilize a radiating cable, fixed antennas, or a combination of both.
- C. Supported Frequencies: The radio system shall support frequencies in the 700 and 800 MHz public safety bands as utilized by the local Fire Department.
- D. Reject Filters: Notch filter sections shall be incorporated to minimize adjacent channel cellular and SMR (Nextel) degradation of the signal booster performance. The minimum downlink band adjacent band rejection shall be 35 dB or greater at 865 MHz and 870 MHz.
- E. Band Migration Capability: The signal booster shall include re-tunable or replaceable filters to accommodate rapid and economic passband changes in the event of mandatory FCC changes within the NPSPAC band. The use of non-adjustable and non-replaceable RF input and output filters is prohibited.

- F. Output Level Control: An automatic output leveling circuit shall be included for both passbands with a minimum dynamic range of 60 dB, less any gain reduction setting, to maintain FCC out of band and spurious emission compliance.
- G. Degraded Performance in Emergencies: The system shall be designed to allow degraded performance in adverse conditions, such as abnormally high temperatures resulting from nearby fires, extreme voltage fluctuations or other abnormal conditions that may occur during an emergency. Circuits that intentionally disable the signal booster in such situations (i.e. under/over voltage, over/under current, over/under temperature, etc.) will not be implemented as the standard mode for public safety applications.
- H. Mode of Operation: The system shall be normally powered on and shall continuously provide passing of frequencies within the Public Safety and First Responder bands.
- I. All in-building radio systems shall be compatible with both analog and digital communications simultaneously at the time of installation.

## 2.03 SYSTEM MONITORING

- A. The distributed antenna system shall include a connection to the fire alarm system to monitor the integrity of the circuit of the signal booster(s) and power supplies and annunciate this malfunction on the fire alarm system shall comply with 4.4.7.1 of NFPA 72.
- B. A sign shall be located at the fire alarm panel with the name and telephone number of the local Fire Department indicating that they shall be notified of any failures that extend past the 2 hour time limit.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Distribution System Signal Wires and Cables
  - 1. Wires and cables shall enter each equipment enclosure, console, cabinet or rack in such a manner that all doors or access panels can be opened and closed without removal or disruption of the cables.
  - 2. Routing and Interconnection
    - a. Wires or cables routed between consoles, cabinets, racks, and other equipment shall be installed in an approved conduit or cable tray that is secured to building structure.
    - b. Completely test all of the cables after installation and replace any that are found to be defective.
  - 3. Install cables without damaging conductors, shield, or jacket.
  - 4. Do not bend cables, while handling or installing, to radii smaller than as recommended by manufacturer.
  - 5. Pull cables without exceeding cable manufacturer's recommended pulling tensions.
- B. Product Delivery, Storage, and Handling
  - 1. Delivery: Deliver materials to the job site in OEM's original unopened containers, clearly labeled with the OEM's name and equipment model and serial identification numbers.
  - 2. Store and protect equipment in a conditioned space until installation.
- C. System Installation
  - 1. Coaxial antenna cabling shall not be installed in the same conduit, raceway, or cable trays used for other systems.
  - 2. All equipment shall be connected according to the OEM's specifications to insure correct installation and system performance.
  - 3. Coordinate all roof penetrations with Owner and/or roofing contractor.

### 3.02 LICENSING

- A. All fees associated with the licensing shall be paid by the Owner.
- B. All testing must be done on frequencies authorized by the FCC.

### 3.03 GROUNDING

- A. Ground cable shields and equipment per Manufacturer's requirements.
- B. Antenna mast shall be grounded per NFPA 70 NEC requirements and antenna manufacturer's requirements. Provide grounding blocks and surge protection for outside coaxial cabling. Bond the antenna mast to the existing lightning protection system if available.

### 3.04 APPROVAL TESTING

- A. The local Fire Department will review plans and specifications. Upon acceptance, plans will be stamped to indicate approval. Stamped plans are required to be present at the acceptance test. Any field changes that occur during construction shall be incorporated into new As-Built plans, including any manufacturer's data sheets for any equipment changes not submitted in the original submittal. As-Built plans, if required due to system changes, shall be submitted to the local Fire Department for approval.
- B. Tests shall be made using frequencies close to the frequencies used by the Fire Department and appropriate emergency services. If testing is done on the actual frequencies, then this testing must be coordinated with the local Fire Department unit. All testing must be done on frequencies authorized by the FCC. A valid FCC license will be required if testing is done on frequencies different from the police, fire or emergency medical frequencies.
- C. Testing Procedures
  - 1. Minimum Signal Strength: For testing system signal strength and quality, the testing shall be based on the delivered audio quality (DAQ) system. A DAQ level below 3.0 shall be considered a failed test for a given grid cell.
  - 2. Measurements shall be made with the antenna held in a vertical position at 3 to 4 feet above the floor to simulate a typical portable radio worn on the belt or turnout coat pocket.
- D. Final Acceptance Testing
  - 1. All acceptance testing shall be done in the presence of a local Fire Department representative or by the local Fire Department unit at no expense to the City.
  - 2. Small scale drawings (11 inch x 17 inch maximum) of the structure shall be provided by the Contractor to the Owner. The plans shall show each floor divided into the grids as described above, and the results of the pre-testing. Each grid shall be labeled to indicate the DAQ result from the final acceptance testing.
  - 3. The Contractor shall provide the latest approved plans for the system, including any manufacture's data sheets for any equipment changes not submitted in the original submittal to the Owner.
  - 4. Include testing results of the repeater (output wattage, gain level, etc) and connection to the fire alarm.

### 3.05 MAINTENANCE AND ANNUAL TESTING

- A. Annual tests will be conducted by the local Fire Department unit or authorized company.
  - 1. The re-testing will be done at no expense to the City or the appropriate emergency services departments as required in the original testing procedures.
- B. Maintenance Contract
  - 1. Maintenance contract with a Radio Service Provider in place with name of authorized company, who will provide a 24 hour by 7 day emergency response within two (2) hours after notification.

- The system shall be maintained in accordance with FCC requirements. The contract shall be for 5 years.
2. All tests shall be conducted, documented, and signed by a person in possession of a current FCC General Radio telephone Operator License, or a technician certification issued by the Association of Public-Safety Communications Officials International (APCO) or equivalent as determined by the local Fire Department.
  3. Maintain a list of contact personnel with phone numbers at the radio repeater system cabinet. The contact personnel shall have knowledge of the building and the repeater system and be available to respond to the building in the case of an emergency.
  4. Radio Service Provider maintenance contract shall include but not limited to:
    - a. Annual Test
      - 1) All active components of the distributed antenna system, including but not limited to amplifier, power supplies, and back-up batteries, shall be tested a minimum of once every 12 months.
      - 2) Amplifiers shall be tested to ensure that the gain is the same as it was upon initial installation and acceptance. The original gain shall be noted and any change in gain shall be documented.
      - 3) Back-up batteries and power supplies shall be tested under load for a period of 1 hour to verify that they will operate during an actual power outage.
      - 4) Active components shall be checked to determine that they are operating within the manufacturer's specifications for their intended purpose.
      - 5) Documentation of the test shall be maintained on site and a copy forwarded to the local Fire Department Radio Supervisor upon completion of the test.
  5. Fire Department Radio personnel, after providing reasonable notice to the Owner or their representative, shall have the right to enter onto the property to conduct field testing to be certain that the required level of radio coverage is present.

END OF SECTION



## 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. Section Includes:
  - 1. Fire-alarm control unit.
  - 2. Manual fire-alarm boxes.
  - 3. System smoke detectors.
  - 4. Heat detectors.
  - 5. Notification appliances.
  - 6. Device guards.
  - 7. Addressable interface device.
  - 8. Cellular alarm communicator transmitter.
  - 9. Network communications.

### 1.3 DEFINITIONS

- A. EMT: Electrical Metallic Tubing.
- B. FACP: Fire Alarm Control Panel.
- C. HLI: High Level Interface.
- D. NICET: National Institute for Certification in Engineering Technologies.
- E. PC: Personal computer.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product, including furnished options and accessories.
  - 1. Include construction details, material descriptions, dimensions, profiles, and finishes.
  - 2. Include rated capacities, operating characteristics, and electrical characteristics.
- B. Shop Drawings: For fire-alarm system.
  - 1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
  - 2. Include annunciators, fire alarm controls panel, transponders, and notification power supplies on floor plans.

3. Manufacturer's data sheets indicating model numbers and listing information for equipment, devices, and materials.
4. Include plans, elevations, sections, details, and attachments to other work.
5. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate power connections, conductor types and sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
6. Detail assembly and support requirements.
7. Include voltage drop calculations for notification-appliance circuits.
8. Include battery-size calculations.
9. Include power connection.
10. Include input/output matrix.
11. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
12. Include performance parameters and installation details for each detector.
13. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
14. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams. Include details of ceiling height and construction.
15. Include a floor plan that indicates the use of all rooms.
16. Include locations of alarm-initiating devices and alarm notification appliances including candela ratings for visible alarm notification appliances on floor plans.
17. Include information on the interface of fire safety control functions.

C. General Submittal Requirements:

1. Shop Drawings shall be prepared by persons with the following qualifications:
  - a. NICET-certified, fire-alarm technician; Level IV minimum.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Field quality-control reports.

## 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.
  - 1. Include the following:
    - a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
    - b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
    - c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
    - d. Riser diagram.
    - e. Device addresses.
    - f. Record copy of site-specific software.
    - g. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:
      - 1) Equipment tested.
      - 2) Frequency of testing of installed components.
      - 3) Frequency of inspection of installed components.
      - 4) Requirements and recommendations related to results of maintenance.
      - 5) Manufacturer's user training manuals.
    - h. Manufacturer's required maintenance related to system warranty requirements.
    - i. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.

## 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
  - 2. Smoke Detectors: Quantity equal to 10 percent of amount of each type installed, but no fewer than one unit of each type.
  - 3. Detector Bases: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.
  - 4. Keys and Tools: One extra set for access to locked or tamperproofed components.
  - 5. Audible and Visual Notification Appliances: One of each type installed.
  - 6. Fuses: Two of each type installed in the system. Provide in a box or cabinet with compartments marked with fuse types and sizes.

## 1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level IV technician.
- B. NFPA Certification: Obtain certification according to NFPA 72 by an NRTL (nationally recognized testing laboratory).
- C. Fire alarm contractor must be certified in accordance with the Tennessee Alarm Contractors Licensing Act of 1991, TCA Title 62, Chapter 32, Part 3 "Alarm Contractors Licensing Act.", available at: <http://www.lexisnexis.com/hottopics/tncode/>.

## 1.9 PROJECT CONDITIONS

- A. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless approval has been obtained from owner and fire watch is provided per paragraph 1.10A of this specification section.
- B. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.

## 1.10 SEQUENCING AND SCHEDULING

- A. Existing Fire-Alarm Equipment: Provide fire watch as required by the Authority Having Jurisdiction if the existing fire alarm system becomes disabled. Coordinate schedule of work and outages with Owner.

## 1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Extent: All equipment and components not covered in the Maintenance Service Agreement.
  - 2. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 SYSTEM DESCRIPTION

- A. Noncoded, UL-certified addressable system, with multiplexed signal transmission and voice/strobe evacuation.
- B. Automatic sensitivity control of certain smoke detectors.
- C. All components provided shall be listed for use with the selected system.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

## 2.2 SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one or more of the following devices:
  - 1. Manual stations.
  - 2. Heat detectors.
  - 3. Smoke detectors.
  - 4. Duct smoke detectors.
  - 5. Automatic sprinkler system water flow.
  - 6. Existing building fire alarm system signal
- B. Fire-alarm signal shall initiate the following actions:
  - 1. Continuously operate alarm notification appliances, including voice evacuation notices.
  - 2. Identify alarm and specific initiating device at fire-alarm control unit and connected network control panels.
  - 3. Transmit an alarm signal to the remote alarm receiving station.
  - 4. Release fire and smoke doors held open by magnetic door holders.
  - 5. Activate voice/alarm communication system.
  - 6. Record events in the system memory.
  - 7. Send signal to existing building fire alarm system to go into alarm.
- C. Supervisory signal initiation shall be by one or more of the following devices and actions:
  - 1. Loss of communication with any panel on the network.
  - 2. Valve supervisory switch
- D. System trouble signal initiation shall be by one or more of the following devices and actions:
  - 1. Open circuits, shorts, and grounds in designated circuits.
  - 2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
  - 3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, or Ethernet module.
  - 4. Loss of primary power at fire-alarm control unit.
  - 5. Ground or a single break in internal circuits of fire-alarm control unit.
  - 6. Abnormal ac voltage at fire-alarm control unit.
  - 7. Break in standby battery circuitry.
  - 8. Failure of battery charging.
  - 9. Abnormal position of any switch at fire-alarm control unit or annunciator.
  - 10. Voice signal amplifier failure.

11. Trouble on existing FACP.

E. System Supervisory Signal Actions:

1. Initiate supervisory service audible signal and illuminate the LED at the control unit and remote annunciator.
2. Identify specific device initiating the event at fire-alarm control unit and connected network control panels.
3. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.

F. Trouble Signal Actions:

1. Send trouble signal to existing building fire alarm system.

## 2.3 FIRE-ALARM CONTROL UNIT

A. General Requirements for Fire-Alarm Control Unit:

1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864.
  - a. System software and programs shall be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining the information through failure of primary and secondary power supplies.
  - b. Include a real-time clock for time annotation of events on the event recorder.
  - c. Provide communication between the FACP and remote circuit interface panels, annunciators, and displays.
  - d. The FACP shall be listed for connection to a central-station signaling system service.
  - e. Provide nonvolatile memory for system database, logic, and operating system and event history. The system shall require no manual input to initialize in the event of a complete power down condition. The FACP shall provide a minimum 500-event history log.
2. Addressable Initiation Device Circuits: The FACP shall indicate which communication zones have been silenced and shall provide selective silencing of alarm notification appliance by building communication zone.
3. Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: The FACP shall be listed for releasing service.
4. The fire alarm control unit shall be provided with enough spare capacity for future expansion of system upon required replacement of existing system in existing middle school and future required upgrade of existing building fire alarm system coverage to current codes.

B. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

1. Annunciator and Display: Liquid-crystal type, 80 characters, minimum.
2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.

- C. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:
  - 1. Pathway Class Designations: NFPA 72, Class B.
  - 2. Install no more than 50 addressable devices on each signaling-line circuit.
  - 3. Serial Interfaces:
    - a. One dedicated RS 485 port for remote station operation using point ID DACT.
    - b. One RS 485 port for remote annunciators, Ethernet module, or multi-interface module (printer port).
    - c. One USB port for PC configuration.
    - d. One RS232 port for voice evacuation interface.
- D. Smoke-Alarm Verification:
  - 1. Initiate audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.
  - 2. Activate an approved "alarm-verification" sequence at fire-alarm control unit and detector.
  - 3. Sound general alarm if the alarm is verified.
  - 4. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.
- E. Notification-Appliance Circuit:
  - 1. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.
  - 2. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.
- F. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke-barrier walls shall be connected to fire-alarm system.
- G. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.
- H. Voice/Alarm Signaling Service: Central emergency communication system with redundant microphones, preamplifiers, amplifiers, and tone generators provided as a special module that is part of fire-alarm control unit.
  - 1. Indicate number of alarm channels for automatic, simultaneous transmission of different announcements to different zones or for manual transmission of announcements by use of the central-control microphone. Amplifiers shall comply with UL 1711.
    - a. Allow the application of, and evacuation signal to, indicated number of zones and, at the same time, allow voice paging to the other zones selectively or in any combination.
    - b. Programmable tone and message sequence selection.
    - c. Standard digitally recorded messages for "Evacuation" and "All Clear."
    - d. Generate tones to be sequenced with audio messages of type recommended by NFPA 72 and that are compatible with tone patterns of notification-appliance circuits of fire-alarm control unit.
  - 2. Status Annunciator: Indicate the status of various voice/alarm speaker zones and the status of firefighters' two-way telephone communication zones.

3. Preamplifiers, amplifiers, and tone generators shall automatically transfer to backup units, on primary equipment failure.
- I. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals, supervisory and cellular alarm communicator transmitters shall be powered by 24-V dc source.
  1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.
- J. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
  1. Batteries: Sealed lead calcium.

## 2.4 MANUAL FIRE-ALARM BOXES

1. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
2. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.

## 2.5 SYSTEM SMOKE DETECTORS

- A. General Requirements for System Smoke Detectors:
  1. Comply with UL 268; operating at 24-V dc, nominal.
  2. Detectors shall be two-wire type.
  3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
  4. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
  5. Integral Visual-Indicating Light: LED type, indicating detector has operated .
- B. Photoelectric Smoke Detectors:
  1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
  2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
    - a. Primary status.
    - b. Device type.
    - c. Present average value.

- d. Present sensitivity selected.
- e. Sensor range (normal, dirty, etc.).

C. Duct Smoke Detectors: Photoelectric type complying with UL 268A.

- 1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
- 2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
  - a. Primary status.
  - b. Device type.
  - c. Present average value.
  - d. Present sensitivity selected.
  - e. Sensor range (normal, dirty, etc.).
- 3. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
- 4. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.

2.6 HEAT DETECTORS

A. General Requirements for Heat Detectors: Comply with UL 521.

- 1. Temperature sensors shall test for and communicate the sensitivity range of the device.

B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F (57 deg C) or a rate of rise that exceeds 15 deg F (8 deg C) per minute unless otherwise indicated.

- 1. Mounting: Adapter plate for outlet box mounting.
- 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

2.7 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Individually addressed, connected to a signaling-line circuit, equipped for mounting as indicated, and with screw terminals for system connections.

- 1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.

B. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level as indicated on drawings, measured 10 feet (3 m) from the horn, using the coded signal prescribed in UL 464 test protocol.

C. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.

1. Rated Light Output:
  - a. As indicated on drawings.
2. Mounting: Wall mounted unless otherwise indicated.
3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
4. Flashing shall be in a temporal pattern, synchronized with other units.
5. Strobe Leads: Factory connected to screw terminals.
6. Mounting Faceplate: Factory finished, red.

D. Voice/Tone Notification Appliances:

1. Comply with UL 1480.
2. Speakers for Voice Notification: Locate speakers for voice notification to provide the intelligibility requirements of the "Notification Appliances" and "Emergency Communications Systems" chapters in NFPA 72.
3. High-Range Units: Rated 2 to 15 W.

2.8 ADDRESSABLE INTERFACE DEVICE

A. General:

1. Include address-setting means on the module.
2. Store an internal identifying code for control panel use to identify the module type.

B. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.

2.9 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632.

B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture [one] [two] telephone line(s) and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.

C. Local functions and display at the digital alarm communicator transmitter shall include the following:

1. Verification that both telephone lines are available.
2. Programming device.

3. LED display.
4. Manual test report function and manual transmission clear indication.
5. Communications failure with the central station or fire-alarm control unit.

D. Digital Data transmission shall include the following:

1. Address of the alarm-initiating device.
2. Address of the supervisory signal.
3. Address of the trouble-initiating device.
4. Loss of ac supply.
5. Loss of power.
6. Low battery.
7. Abnormal test signal.
8. Communication bus failure.

2.10 NETWORK COMMUNICATIONS

- A. Provide network communications for fire-alarm system according to fire-alarm manufacturer's written requirements.

2.11 DEVICE GUARDS

- A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.
  1. Factory fabricated and furnished by device manufacturer.
  2. Finish: Paint of color to match the protected device.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."
- B. Install wall-mounted equipment, with tops of cabinets not more than 78 inches (1980 mm) above the finished floor, unless noted otherwise.
- C. Manual Fire-Alarm Boxes:
  - 1. Install manual fire-alarm box in the normal path of egress within 60 inches (1520 mm) of the exit doorway.
  - 2. Mount manual fire-alarm box on a background of a contrasting color.
  - 3. The operable part of manual fire-alarm box shall be between 42 inches (1060 mm) and 48 inches (1220 mm) above floor level. All devices shall be mounted at the same height unless otherwise indicated.
  - 4. HVAC: Locate detectors not closer than 36 inches (910 mm) from air-supply diffuser or return-air opening.
  - 5. Lighting Fixtures: Locate detectors not closer than 12 inches (300 mm) from any part of a lighting fixture and not directly above pendant mounted or indirect lighting.
- D. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.
- E. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches (9100 mm) long shall be supported at both ends.
- F. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.
- G. Visible Alarm-Indicating Devices: Install adjacent to each alarm horn and at least 6 inches (150 mm) below the ceiling. Install all devices at the same height unless otherwise indicated.

### 3.3 PATHWAYS

- A. Pathways shall be installed in conduit.

### 3.4 CONNECTIONS

- A. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches (910 mm) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
  - 1. Magnetically held-open doors.
  - 2. Supervisory connections at valve supervisory switches.

### 3.5 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
- B. Ground shielded cables at the control panel location only. Insulate shield at device location.

### 3.6 FIELD QUALITY CONTROL

- A. Field tests shall be witnessed by Architect.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
- D. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. Visual Inspection: Conduct visual inspection prior to testing.
    - a. Inspection shall be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
    - b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
  - 2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
  - 3. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
- E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- F. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- G. Prepare test and inspection reports.
- H. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

### 3.7 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning,

and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

1. Include visual inspections according to the "Visual Inspection Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
2. Perform tests in the "Test Methods" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Perform tests per the "Testing Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

### 3.8 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A Protection of existing improvements
- B Protection of existing trees to remain.
- C Site clearing.
- D Topsoil stripping, clearing, grubbing.
- E Removal of above and below grade improvements.

1.02 RELATED SECTIONS

- A Applicable provisions of the General Conditions, Supplementary Conditions, and Division 01, General Requirements.
- B Section 31 20 00 – Earthwork.

1.03 PROJECT CONDITIONS

- A Traffic: Conduct site clearing operations to ensure minimum interference with roads, streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROTECTION OF EXISTING IMPROVEMENTS, TREES, AND VEGETATION

- A Protection of Existing Improvements:
  - 1. Provide protections necessary to prevent damage to existing improvements indicated to remain.
  - 2. Protect improvements on adjoining properties and on the Owner's property.
  - 3. Restore damaged improvements to their original condition, as acceptable to property owners and other parties having jurisdiction.
- B Protection of Existing Trees and Vegetation:
  - 1. Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning or bruising of bark, smothering or trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within the drip line. Provide temporary guards to protect trees and vegetation to be left standing.
  - 2. Water trees and other vegetation to remain within the limits of the contract work as required to maintain their health during the course of construction operations.
  - 3. Provide protection for roots over 1-1/2 inches diameter which are cut during construction operations. Coat the cut faces with an emulsified asphalt, or other acceptable coating, formulated for use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out. Cover with earth as soon as possible.
  - 4. Repair or replace trees and vegetation indicated to remain which are damaged by construction operations, in a manner acceptable to the Architect. Employ a licensed arborist to repair damage to trees and shrubs. Replace trees which cannot be repaired and restored to full growth status, as determined by the arborist.
- C Salvageable Improvements: Carefully remove items indicated to be salvaged, and store on the Owner's premises where indicated or directed.

3.02 SITE CLEARING

A General:

1. Remove trees, shrubs, grass, and other vegetation, improvements, or obstructions as required to permit installation of new construction. Remove similar items elsewhere on the site or premises unless specifically indicated to remain. Removal includes digging out and off-site disposing of roots and stumps.
2. Carefully and cleanly cut minor roots and branches of trees indicated to be left standing, where such roots and branches obstruct new construction.

B Topsoil:

1. Topsoil is defined as friable clay loam surface soil found in depth of not less than 4 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material.
2. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.
3. Remove heavy growths of grass from areas before stripping.
4. Where existing trees are indicated to remain, leave existing topsoil in place within drip lines to prevent damage to root system.
5. Stockpile topsoil in storage piles in areas shown, or where otherwise directed. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent windblown dust.

C Clearing and Grubbing:

1. Clear site of trees, shrubs and other vegetation, except for those specifically indicated to be left standing.
2. Completely remove stumps, roots, and other debris protruding through the ground surface.
3. Use only hand methods for grubbing inside the drip lines of trees indicated to be left standing.
4. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
5. Place fill material in horizontal layers not exceeding 6 inches loose depth, and thoroughly compact to a density equal to adjacent original ground.

D Removal of Improvements:

1. Remove above-ground and below-grade improvements as indicated and as necessary to facilitate new construction.
2. Abandonment or removal of certain underground pipe or conduits may be shown on mechanical or electrical drawings and is included under work of related Divisions 22 and 26 Sections. Removal of abandoned underground piping or conduit interfering with construction is included in this Section.

3.03 DISPOSAL OF WASTE MATERIALS

A Burning is not permitted on the Owner's property.

B Remove waste materials and unsuitable or excess topsoil from Owner's property and dispose of legally.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A Drainage fabric.
- B Buried warning and identification tape.
- C Backfill material.
- D Engineered fill.
- E Topsoil.
- F Undercut at foundations.
- G Classification of excavated materials.
- H Groundwater in excavations.
- I Differing site conditions.
- J Rock excavation.
- K Excavations.
- L Unsuitable soil.
- M Payment for excavation of rock or unsuitable soil.
- N Protection of existing work and landscape features.
- O Protection of excavation.
- P Stability of excavation.
- Q Backfilling.
- R Rough grading.
- S Excavation for utility trenches.
- T Utility trench backfill.
- U Fine grading.
- V Disposal of surplus material and vegetation.
- W Work includes, but is not limited to: Soils Engineer monitoring, topsoiling and fine grading of areas to be seeded; topsoiling and fine grading of planting areas; excavating and grading for building drives and walks, controlled filling and porous fill.

1.02 RELATED SECTIONS

- A Applicable provisions of the General Conditions, Supplementary Conditions, and Division 1, General Requirements, apply to the work under this section.
  - 1. Section 01 40 00 - Quality Control.
  - 2. Division 22 – Plumbing.
  - 3. Division 26 – Electrical.

4. Division 33 – Utilities.

- B The Subsurface Investigation Report is the basis for the design. The Contractor shall make note and comply with suggestions incorporated in the included Soils Engineering Reports relative to cut, fill, compaction, removal of unsatisfactory material, maintenance of site drainage or other soils-related conditions.

1.03 EXAMINATION OF THE SITE

- A Bidders upon work under this section, before submitting bids, shall visit and carefully examine the site so as to familiarize themselves with the existing conditions, including amount of topsoil available, and the difficulties that will affect the execution of the work. The submission of a bid will be construed as evidence that such an examination has been made.

1.04 DETERMINATION OF FOUNDATION BEARING CAPACITY BY GEOTECHNICAL ENGINEER

- A Foundation bearing capacity shall be determined on the basis of scientific analysis utilizing investigations, tests, or studies conducted or provided by the soils testing engineer.
- B Documentation of foundation bearing capacity shall be submitted to the Structural Engineer of record. Submittal shall identify the project, contain the name, address and registration number of the designated engineer and shall indicate type and frequency of tests performed as well as their location within the project.

1.05 SUBMITTALS

- A Submit one copy of permits and notices obtained from authority having jurisdiction before commencing work.
- B Obtain and submit certification of adequacy of site grading and filling from Testing Laboratory, signed and sealed by the Geotechnical Engineer of record, registered in the state in which the work is performed, stating that work is in accordance with Contract Documents, and that soils are capable of supporting the structure to be constructed under the Contract.
- C If bench marks and other permanent reference points are displaced, obtain and submit certification, signed and sealed by a licensed surveyor, of proper re-establishment of bench marks and reference points.
- D The Contractor shall submit samples of approximately 50 pounds each of the fill materials he proposes to use to testing agency approved by the Owner at least ten (10) days prior to its use. The testing agency shall test such samples, classify them as specified by U.S. Bureau of Public Roads, and determine the moisture-density in pounds per cubic foot of oven-dried weight.

1.06 PROJECT CONDITIONS

- A The Subsurface Investigation Report is the basis for the design. The Contractor shall make note and comply with suggestions incorporated in the included Soils Engineering Reports relative to cut, fill, compaction, removal of unsatisfactory material, maintenance of site drainage or other soils-related conditions. Any conflicts or contradictions between the Subsurface Investigation Report and any portion of this specification, the conflict shall be brought to the attention of the Architect and clarified prior to proceeding with the work of this section.
- B Additional test borings and other investigatory operations may be undertaken by Contractor at the Contractor's option. However, no change in Contract Amount will be made for such operations.
- C Notify Owner's representative when excavations have reached required elevations. If it is determined that bearing materials are unsuitable, continue excavations until suitable bearing is encountered. Contract Amount may be adjusted by an appropriate Contract modification.

- D Locate and, where indicated to remain, protect and support existing utilities. If uncharted or incorrectly charted items are encountered, immediately notify utility company and cooperate with utility company's directives. Cooperate with Owner and utility companies in order to keep services and facilities in operation. Repair any damages caused by Work to the satisfaction of the affected utility company.
- E If utility service must be interrupted, give 72-hour notice to Owner's representative, and obtain written approval prior to such interruption.
- F Provide barricades and warning lights for open excavations. Operate warning lights as and when recommended by authorities having jurisdiction. Remove such protective items when no longer required.
- G Protect structures, utilities, sidewalks, paving, and other facilities from damage due to settlement, lateral movement, undermining, washout, and other hazards resulting from earthwork operations.
- H Root systems of trees to remain are to be protected from damage or drying out; cover exposed roots with burlap.

## PART 2 PRODUCTS

### 2.01 ALLOWANCES

- A The Contractor shall include in his Base Bid any Allowances described in Section 01 21 00.

### 2.02 DRAINAGE FABRIC

- A Non-woven geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:
  - 1. Grab Tensile Strength: 110 lbf (490 N); ASTM D 4632.
  - 2. Tear Strength: 40 lbf (178 N); ASTM D 4533.
  - 3. Puncture Resistance: 50 lbf (222 N); ASTM D 4833.
  - 4. Water Flow Rate: 150 gpm per sq. ft. (100 L/s per sq. m); ASTM D 4491.
  - 5. Apparent Opening Size: No. 50 (0.3 mm); ASTM D 4751.

### 2.03 BURIED WARNING AND IDENTIFICATION TAPE

- A. Polyethylene plastic and metallic core or metallic-faced, acid and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read "CAUTION BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil.

#### Warning Tape Color Codes:

Red	Electric
Yellow	Gas, Oil, Dangerous Materials
Orange	Telephone and Other Communications
Blue	Water Systems
Green	Sewer Systems
White	Steam Systems

- B. Warning Tape for Metallic Piping: Acid and Alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.003 inch. Tape shall have a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.

2.04 BACKFILL MATERIAL

- A Backfill material shall be a type that can be compacted to the densities specified under the conditions existing at the site at the time it is placed.
- B Stone for compacted backfill under slabs shall be evenly graded mixture of crushed stone or crushed or uncrushed gravel, with one hundred percent (100%) passing a 1-1/2" sieve and not more than five percent (5%) passing a No. 4 sieve.
- C Earth for compacted backfill and engineered fill shall consist of clean granular soils, clay soils, or shale soils having a plasticity index of less than 30 and a minimum density of 90 pounds per cubic foot when compacted to one hundred percent (100%) of its maximum dry density per standard proctor test. (ASTM D698) Material shall be free of vegetation, roots, rocks larger than 2" in any dimension, debris and other deleterious materials. Residual soil excavated at the site may be used for backfill if it meets the specification requirements. The moisture content of the fill soils should be maintained within +3 and -3 percentage points of optimum moisture content determined from the standard Proctor compaction test.
- D Cohesive soils that have become hard and lumpy or that have been piled and become dry shall be broken up and properly conditioned for optimum moisture content immediately before using as backfill. However, in no case shall earth backfill be wetted or puddled in place.
- E Backfill at retaining walls (if any) shall be ASTM #57 or #67 stone.

2.05 ENGINEERED FILL

- A All fill in areas to be occupied by the building(s) and paving, including an area 10 feet outside the perimeters thereof, and any areas noted on the site plan as "Future Expansion" shall be controlled (engineered) fill and the compaction shall be tested by an Agency as specified in Section 01 40 00 Quality Control. Controlled fill in areas of buildings shall be compacted in thin lifts to at least 98% of maximum dry density within 3% of optimum moisture content in accordance with ASTM Specification D-698 (standard proctor). Fill in areas of asphalt paving shall be compacted in thin lifts to at least 98% of maximum dry density within 3% of optimum moisture content in accordance with ASTM Specification D 698. The upper 12 inches of fill beneath pavements and upper 24 inches beneath footings and grade slabs shall be compacted to 100%.
- B Where rock is excavated to 24 inches below footings, the footing excavations shall be refilled from top of rock to bottom of footings with controlled compacted fill.

2.06 TOPSOIL

- A Shall be natural, fertile, agricultural soil, capable of sustaining vigorous plant growth. It shall be of uniform friable clay loam composition throughout, without admixture of subsoil. Soil shall be free of stones, lumps, live plants and their roots, sticks and other extraneous matter. The soil shall not be contaminated with substances harmful to the growth of plants and humans. It shall have a pH range of 5.0 to 7.0 and contain not less than five percent (5%) organic matter. The topsoil shall be free of noxious weeds, grasses or other foreign vegetation which would cause maintenance problems for the Owner after the contract is complete. Contractor shall assume full responsibility for control of noxious species introduced by the addition of soil infested with such species for a period of one year from Provisional Acceptance of the Work.

2.07 UNDERCUT AT FOUNDATIONS

- A Undercut and backfill with compacted stone at foundations shall be performed if directed by the Architect, based on the results of in place testing of earth at foundation sub-grades. In areas where unsuitable soils are encountered at or near foundation level, the foundation shall be undercut to a depth and width of two times the foundation bearing level or to competent bearing soils. The trench shall be backfilled with compacted stone to the level of foundation bearing.

2.08 CLASSIFICATION OF EXCAVATED MATERIALS

- A Materials to be excavated shall be classified as topsoil suitable for fine grading and planting beds, soil suitable for use in engineered fill, soil unsuitable for use in engineered fill, and rock.
- B It is understood that full compensation has been included in the Base Bid amount for all excavation work, including the furnishing and installing of all filling and backfilling materials required, except (1) the removal of rock (2) excavating and backfilling of areas of unsuitable soil (3) changes in the work made after award of the contract and (4) work required because of differing site conditions as defined hereinafter.

2.09 GROUNDWATER IN EXCAVATIONS

- A It is anticipated that ground water will be encountered in the course of the work. The Contractor shall coordinate his work so that any ground water is controlled and directed to existing or newly constructed storm drainage structures. Measures such as temporary trenching and pumping should be anticipated and shall not be given consideration as differing site conditions.

2.10 DIFFERING SITE CONDITIONS

- A The Contractor shall promptly, and before such conditions are disturbed, notify the Architect in writing of sinkholes or caves encountered in excavations.
- B The Architect and the Soil Engineer will promptly investigate the conditions, and if they find such conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for performance of any part of the work under this Contract, whether or not changed as a result of such conditions, an equitable adjustment shall be made and the Contract modified in writing accordingly by a change order.
- C No claim of the Contractor under this clause shall be allowed unless the Contractor has given the notice required in Subparagraph A above; provided, however, the time prescribed therefore may be extended by the Owner.
- D No claim by the Contractor for an equitable adjustment hereunder shall be allowed if asserted after final payment under the Contract.

PART 3 EXECUTION

3.01 ROCK EXCAVATION

- A Material to be excavated is assumed to be earth and other materials that can be removed by power shovel, power spade, backhoe, bulldozer, or other equipment normal to excavation work, but not requiring the use of explosives or drills. If rock, as herein defined, is encountered within the limits of excavation, the "Contract Price" will be adjusted. When the rock is encountered, the Contractor shall immediately notify the Architect and shall not proceed further until instructions are given and measurements made for the purpose of establishing volume of rock excavation.
- B Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material exceeding 1 cu.yd. for bulk excavation or 3/4 cu.yd. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting (when permitted):
  - 1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator equivalent to Caterpillar Model No. 3201; equipped with a 24 inch wide, short-tip-radius rock bucket; rated at not less than 120 hp flywheel power with bucket-curling force of not less than 25,000 lbf and stick-crowd force of not less than 18,700 lbf; measured according to SAE J-1179.
  - 2. Bulk Excavation: Late-model, track-mounted loader equivalent to Caterpillar Model No. 973; rated at not less than 210 hp flywheel power and developing a minimum of 45,000 lbf breakout force; measured according to SAE J-732.

- C Quantities of excavated rock shall be based on "in-place" volumes. Rock shall be stripped for measurement before excavating, and no rock excavated or loosened before measurement will be allowed or paid for as rock. Measurement and payment, therefore, shall be by the number of cubic yards required to bring the excavation to the required surface or grade shown on the Drawings. The Owner may adjust the grades should excessive rock be encountered.
- D Before placing concrete or masonry or rock surfaces, the surfaces shall be leveled off, or shelved, to a slope not exceeding one inch per foot.
- E Payment for rock excavation, as defined above, shall be at the agreed unit price per cubic yard. (Computations will be made in a vertical plane from the lowest point rock is excavated).
- F If the use of explosives is required or desired by the Contractor, Contractor shall present written evidence of appropriate insurance, have written permission from the Architect and all authorities having jurisdiction prior to bringing explosives onto job site or using in the work and shall implement all precautionary measures deemed necessary by all authorities having jurisdiction.
- G If rock is encountered, it shall be excavated to the following limits:
1. Two feet outside of concrete work for which forms are required, except footings.
  2. One foot outside the perimeter of footings and two feet below bottom of footings.
  3. One foot below concrete floor slabs on grade.
  4. In all pipe trenches, 6" below invert elevation of pipe and 2 feet wider than the inside diameter of the pipe, but not less than three feet trench width. Contractor shall notify officials prior to detonation of explosives or beginning noisy drilling operations.
  5. In all other excavated areas: 2 feet below finished grade.

### 3.02 EXCAVATIONS

- A Excavation shall be to depth and of form and size required for installation of work shown on the drawings. Excavations for foundation walls shall be large enough to provide sufficient working space to permit the proper placing and inspection of forms, waterproofing, sleeves, and similar items, and the installation of foundation drains where such drains are shown. Excavation for slabs on grade shall be deep enough to allow for placing porous fill of depths specified under the slabs.
- B Excavation for wall and column footings shall be to firm undisturbed earth or engineered earth fill, sides square and bottoms level. Changes in level of wall footings shall be made by stepping and not by sloping. Trenches, if excavated properly, may be used to maintain the concrete for all footings without the use of forms.
- C Excavations in earth for footings, slabs, walks, and other structures shall not be made to full depths required when freezing temperatures or rain may be expected. Concrete footings shall be placed immediately after excavation is completed. Freezing or water damaged excavations shall be carried deeper as required and backfilled as necessary at no additional cost to the Owner. The Soils Engineer shall observe all footing excavations immediately prior to placing reinforcing steel or concrete.
- D After excavating and rough grading the building areas, and areas to be paved which are in cut, to the required subgrade elevations, and after topsoil has been removed from building areas and areas to be paved which are to receive engineered fill, these areas shall be proof-rolled by the Contractor in the presence of the Soils Engineer using a fully-loaded dump truck or similar pneumatic-tired equipment. Any areas exhibiting significant deflection, in the opinion of the Soil Engineer, shall be stabilized as directed prior to placing any fill. If areas exhibiting deflection cannot be stabilized by compaction, the unsuitable soil shall be undercut as directed by the Soil Engineer and replaced with engineered fill.
- E Any existing underground pipes or electrical conduits that are in service encountered during the excavation shall be temporarily supported and maintained until permanent support has been restored, or until other disposition has been made as directed by the Architect. Existing underground pipes encountered that have

been abandoned or are to be abandoned shall be removed to a point outside the construction excavation and plugged.

- F All non-engineered fill shall be removed in the area of the new construction and replaced with engineered fill. All footing excavations shall be examined and approved by a senior engineering technician working under the direct supervision of a Geotechnical engineer immediately prior to placing reinforcing steel or concrete. Modifications shall be made to the excavation if the Soils Engineer determines that the excavation is not in compliance with the drawings or specifications.
- G In cut areas, excavation shall extend below any deleterious materials or unsatisfactory soil as specified.
- H Cut shall not be carried deeper than necessary to reach required elevations. Fill shall be clean earth as specified for backfilling. Fill shall be placed evenly over the entire area to be filled, in layers. Each layer shall be thoroughly compacted to sufficient density to prevent unsightly settlement.
- J. Foundation Bearing Materials Testing: The Soils Engineer shall observe all footing excavations immediately **prior to placing reinforcing steel or concrete.**
  - 1. For foundations bearing on residual (natural) soils, the bearing materials shall be probed with a minimum 1/2 inch diameter steel probe rod to detect weaker materials. Weaker materials detected by probing shall be tested with dynamic cone penetrometer to verify the design bearing capacity. Test frequency shall be one cone penetrometer test per four individual foundations and per 100 linear feet of strip foundations.
  - 2. For foundations bearing on fill (under the present contract) soils, the bearing materials shall be probed with a minimum 1/2 inch diameter steel probe rod to detect weaker materials. Weaker materials detected by probing shall be tested with a nuclear density gauge to verify the in-place percent compaction conforms to the applicable compaction criteria. Test frequency shall be one nuclear density test per four individual foundations and per 100 linear feet of strip foundations.

### 3.03 UNSUITABLE SOIL

- A In building or paving areas where unsuitable soil conditions are encountered which cannot be stabilized by compaction, or where in the opinion of the Soil Engineer attempting stabilization by compaction would be unsuccessful, the unsuitable soil shall be excavated and removed from the site and the area backfilled with engineered fill specified hereinafter.
- B Quantities of excavated unsuitable soil shall be based on "in-place" volumes. Quantities of unsuitable soil removed shall be determined from measurements made by the Contractor in the presence of the Soils Engineer. Measurements shall be made by cross sectioning and determining depth of cut with a surveyor's level at periodic intervals, or by other methods mutually agreed upon by the Contractor and the Owner. When unsuitable soil is encountered the contractor shall notify the architect and not proceed further until instructions are given. Payment for unsuitable soil, as defined above, shall be made at the agreed unit price per cubic yard.

### 3.04 PAYMENT FOR EXCAVATION OF ROCK OR UNSUITABLE SOIL

- A If rock or unsuitable soil is encountered, a change order will be issued to adjust the Contract Amount after all general excavation in building and paving area is complete.

### 3.05 PROTECTION OF EXISTING WORK AND LANDSCAPE FEATURES

- A Excavating, filling, backfilling and grading shall be performed in such a manner and by such methods that will not damage existing structures, existing underground piping, existing overhead wiring, existing trees (unless noted to be removed), and other landscaping planting.
- B Protect, maintain and restore benchmarks, monuments, and other reference points affected by this work. If bench marks, monuments or other permanent reference points are displaced or destroyed, points shall be

re-established and markers reset under supervision of a licensed surveyor who shall furnish Architect with certification of his work.

**3.06 PROTECTION OF EXCAVATION**

- A Excavation and grading operations shall be performed in a manner that will ensure positive and rapid surface run off of water away from the building area at all times.
- B Banks, slopes and adjacent structures shall be fully protected against harmful sluffing and erosion, by the use of shoring or other temporary construction, if necessary. The excavations shall be kept free of water by temporary dams or drains, pumping or other adequate means, until backfilling is completed.

**3.07 STABILITY OF EXCAVATION**

- A. General: Comply with local codes, ordinances, and requirements of agencies having jurisdiction.
- B. Slope sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
- C. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Extend shoring and bracing as excavation progresses.
- D. Provide permanent steel sheet piling or pressure-creosoted timber sheet piling wherever subsequent removal of sheet piling might permit lateral movement of soil under adjacent structures. Cut off tops a minimum of 2'-6" below final grade and leave permanently in place.

**3.08 BACKFILLING**

- A Excavation below the finished grade shall be backfilled after removing forms, shoring and similar temporary work and after waterproofing, piping, and other underground work has been installed, inspected and approved. Any caving of excavations or any backfill placed before inspections are completed shall be removed as the Architect or Engineer may deem necessary.
- B Material and compaction of backfill for excavations in controlled fill shall conform to requirements specified for controlled fill.
- C Backfill material for use in areas to be seeded or planted shall be clean earth, free from large stones or rock fragments, large roots and debris, but may contain loam or similar organic matter. Backfill in these areas shall be compacted to a density that will prevent unsightly settlement after the finished grading is completed.
- D All backfill, not otherwise specified, shall be deposited in layers not over 10" loose thickness and each layer shall be compacted by light compaction equipment as it is placed.
- E Install porous backfill under concrete slabs on grade. Porous backfill thickness shall be not less than 4" under slabs. Where rock is excavated to 12 inches below concrete floor slabs on grade excavations shall be refilled from top of rock to bottom of slab with porous backfill.
- F Finish grade shall slope away from the structure on all sides.
- G After all turf, topsoil, roots, debris and other objectionable materials that would cause interference with the compaction of the fill have been removed, the area to be filled shall be scarified and broken to a depth of 8 inches. A thin layer, 3 inches thick, of the specified fill material shall be spread on the scarified base and the whole compacted as specified.

- H The fill shall be formed of successive horizontal layers of 6 to 8 inches loose depth deposited in windows and machine spread. Each layer shall be compacted to the percentage of maximum density at optimum moisture content specified by means of sheeps-foot rollers, or other approved mechanical compacting machines. Where the fill is inaccessible to tamping rollers, it shall be consolidated and compacted by mechanical hand tampers.
- I During the fill operation, field compaction tests by means of the Ottawa Sand and Cone Method, ASTM D1556, or other acceptable method, shall be made as often as deemed necessary by the selected testing agency to determine the percent compaction of any completed layer. There shall be taken not less than one compaction test for every 900 square feet for each foot depth to fill. There shall be a representative of the testing agency present on site at all times when engineered fill is being placed. If such test shows failure to meet the required compaction due to insufficient moisture, too much moisture, insufficient rolling or other causes, the Contractor shall remedy the condition by bringing the material to optimum moisture content or by continued rolling and re-compaction. In no case shall the Contractor be permitted to continue filling if the underlying layers fail to meet compaction requirements.
- J The Contractor shall maintain drainage and dryness so that there will be no undue saturation of the fill while the work is in progress. If an area becomes saturated, the Contractor shall remove all soft materials, scarify and re-compact to the required density.
- K Fill in areas other than those where controlled fill is specified shall be earth fill compacted to a density of approximately ninety-five percent (95%) standard proctor to prevent harmful or unsightly settlement of the finished grade, but need not be tested for specific percentage of compaction.

### 3.09 ROUGH GRADING

- A Do all grading inside building to bring subgrade to proper level at underside of floor slab.
- B Do all grading outside the building required to bring the site to the finished grades indicated on the drawings. Subgrade in areas to be seeded and planted shall be brought to within 5" of finished grades.
- C Sub-grades under walks and paved areas shall be brought to proper elevations at bottom of surfacing material to within two-tenths of one foot, plus or minus, of the required grades and profiles.
- D Grades not otherwise shown shall be uniform levels or slopes between points where elevations are given, or between such points and existing finished grades.

### 3.10 EXCAVATION FOR UTILITY TRENCHES

- A Excavate trenches to indicated gradients, lines, depths, and elevations.
1. In the absence of a local code requirement or standard detail, beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B Excavate trenches to uniform widths to provide a working clearance on each side of pipe. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe, unless otherwise indicated.
1. Clearance: As indicated in standard detail or 12" minimum on each side of pipe if no detail is available.
- C Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes. Remove projecting stones and sharp objects along trench subgrade.
1. For ductile or cast iron pipe, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
  2. For PVC or other flexible pipe provide 6" bedding layer of #57 stone.
  3. For all pipe, excavate trenches 6" deeper than elevation required in rock or other unyielding bearing material to allow for #57 stone bedding layer. Provide specified stone.

3.11 UTILITY TRENCH BACKFILL

- A Place and compact bedding course on trench bottoms where indicated as fill area on plans. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- B Backfill trenches excavated under footings and within 18 inches of bottom of footings with concrete to elevation of bottom of footings.
- C Provide 4-inch-thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway sub-base.
- D For typical site installation of ductile or cast iron pipe, place and compact initial backfill of sub-base material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping to avoid damage or displacement of utility system. For PVC or other flexible pipe, backfill with #57 stone (or to plans specifications if differs) to 6" above top of pipe to provide complete stone envelope. Backfill to subgrade with #57 stone in all paved areas.
- E Coordinate backfilling with utilities testing.
- F Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.
- G Place and compact final backfill of satisfactory soil material to final sub grade.
- H Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.12 FINE GRADING

- A All areas where existing grass lawn cover is damaged or disturbed by construction operations. Areas indicated on the site plan to be grass shall be surfaced with topsoil not less than 5" thick after compacting. If the quantity of topsoil existing on the site is insufficient for these purposes, or if the existing topsoil does not conform to the requirements specified above for topsoil, additional topsoil shall be brought to the job or the existing topsoil shall be amended as required to provide the specified quantity and quality of topsoil.
- B After the rough grading and other construction operations have been completed to the point where these areas will not be disturbed by subsequent work, the subgrade shall be cleaned free from waste materials of all kinds, large rocks, and other objectionable material; scarified and pulverized to a depth of 4"; graded to remove remaining surface irregularities; and then covered with the topsoil which was previously removed and stockpiled.
- C If the previously stockpiled topsoil is not sufficient to cover the areas as specified, the Contractor shall furnish additional topsoil obtained from other sources. Topsoil obtained from other sources shall be clean, friable loam free from objectionable weed seeds.
- D Finished grades shall slope away from the building in all cases and shall contain no sinks or dams. Hand trim and rake topsoil to finished grades and leave ready for seeding or planting.

3.13 DISPOSAL OF SURPLUS MATERIAL AND VEGETATION

- A Surplus dirt and rock not required for site improvements shall be removed from the site at the Contractor's expense and to a place of his choosing but only after the Architect has determined it cannot be used on the site. The Owner shall be given the opportunity to keep surplus dirt on site to use as he sees fit. Only after the Owner has stated that they do not wish to retain surplus dirt shall it be removed from the site.

- B All vegetation, roots, trees, etc., are to be hauled away from the site and disposed of by the Contractor and at his expense.
- C Placement of any materials listed in Paragraphs A & B above on any off-site location shall be done only after prior approval of the Owner of the land involved and it shall be the full responsibility of the Contractor and Owner of such land to agree on location, distribution and condition in which such materials are left.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A Underground Passive System for Radon Protection.

1.02 RELATED SECTIONS

- A Applicable provisions of the General Conditions, Supplementary Conditions, and Division 1, General Requirements, apply to the work under this section.
- B Section 31 20 00 – Earthwork.
- C Division 26 – Electrical.

1.03 REFERENCES

- A EPA Passive Radon Control System for New Construction; Document EPA 402-95012 May 1995
- B ASTM International:
  - 1. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.
  - 2. ASTM E2121 - Standard Practice for Installing Radon Mitigation Systems in Existing Low-Rise Residential Buildings.

1.04 SUBMITTALS

- A. Conform to all Submittal Requirements specified herein.
- B. Product Certificates: Certify that products of this section meet or exceed EPA requirements for a passive system.
- C. Qualification Data: For Installer of passive system for radon protection.
- D. Test Reports: Provide testing for the facility pursuant to the current HUD Guidelines.
  - 1. Test facility after construction to verify Radon level baseline. If facility is above 4 pCi/L or more than provide an active system including inline fan.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to install underground passive systems for radon protection and products in jurisdiction where Project is located, and who employs workers trained and approved by system manufacturer to install manufacturer's products.
- B. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

1.06 COORDINATION

- A. Coordinate the installation of the passive units per building with size, location and installation of service utilities.
- B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.07 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor certifying the work and material be free of defects and/or workmanship issues due to defective installation.
  - 1. Warranty Period: **Five** years from date of Substantial Completion.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. Provide material and accessories as required to provide an installation in accordance with ASTM E2121.
- B. PVC 3 inches Diameter Vent pipe: See passive details on drawings.
  - 1. Schedule 40
  - 2. 3 inches PVC "T" fitting
  - 3. Electrical Junction box for inline fan connection

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site, earthwork, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION

- A. Install in strict accordance with all requirements of ASTM E2121.
- B. All concrete slabs that come in contact with the ground shall be laid over a gas permeable material made up of either a minimum 6 inches thick uniform layer of clean aggregate sized greater than ¼ inch and less than 2 inches, overlain by a layer or strips of 6mil polyethylene sheeting designed to allow the lateral flow of soil gases.
  - 1. Seams shall be lapped a minimum of 12 inches.
- C. All openings, gaps and joints in floor and wall assemblies in contact with soil or gaps around pipes, toilets, bathtubs or drains penetrating these assemblies shall be filled or closed with materials that provide a permanent air-tight seal. Seal large openings with non-shrink mortar, grouts or expanding foam sealants and smaller gaps with an elastomeric joint sealant, as defined in ASTM C920.
- D. Provide a junction box for electrical connection to inline fan for active system connection. Also provide system failure notice for inline fan.
- E. Provide a 4 feet x 4 feet sump pit 8 inches deep at the vertical stack for the collection of radon gases at each stack.

### 3.03 CLEANING AND PROTECTION

- A. Remove temporary protective coverings unless otherwise indicated in manufacturer's written installation instructions.
- B. On completion of installation, clean all areas and surfaces as recommended by manufacturer and in accordance with other cleaning procedures specified herein.
- C. Replace any parts or materials that have been damaged or have deteriorated beyond successful repair by touchup or similar minor repair procedures.

END OF SECTION

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. Temporary and permanent erosion control systems.
- B. Slope protection systems.

### 1.02 RELATED DOCUMENTS

- A. Applicable provisions of the General Conditions, Supplementary Conditions, and Division 1, General Requirements, apply to the work under this section.
- B. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents, including but not limited to the project Storm Water Pollution Prevention Plan (SWPPP).

### 1.03 SUBMITTALS

- A. Environmental Permit Requirements: Show compliance with all requirements of the Tennessee General NPDES Permit (TNR 100000) for Storm Water Discharges Associated with Construction Activity (CGP) and the project Storm Water Pollution Prevention Plan (SWPPP). Provide Architect and the local Tennessee Department of Environment and Conservation (TDEC) Environmental Field Office (EFO) with copies of all required paperwork during and at the conclusion of the project. The Contractor is responsible for all maintenance, inspections, record keeping, and reporting.

### 1.04 QUALITY ASSURANCE

- A. Personnel Qualifications: Inspections by the Contractor will be performed by personnel certified in the TDEC Level 1 Erosion Control Course.
- B. Performance: Protect adjacent properties and water resources from erosion and sediment damage throughout Work. Ensure compliance with applicable Federal, State, and local regulations related to erosion and sedimentation control.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. All materials used for sediment and erosion control measures shall conform to the recommendations of the TDEC Erosion and Sediment Control Handbook, latest edition or the requirements of the local governing code agency; whichever is more stringent.
- B. See drawings for specific structural erosion control measures. The measures shown on the plans are a minimum. Contractor is to add, adjust, and maintain structural controls as required to keep silt and dust from leaving the construction site.

## PART 3 EXECUTION

### 3.01 PREPARATION

- A. Examine the Storm Water Pollution Prevention Plan (SWPPP) and the Site Erosion and Sedimentation Control Drawings.
- B. Notify Architect of deficiencies or changes in the SWPPP or Drawings required by current site conditions. Revisions of the Documents will be made as determined by the Architect.

3.02 EROSION CONTROL AND SLOPE PROTECTION IMPLEMENTATION

- A. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to the Site Erosion and Sedimentation Control Drawings as well as the CGP and the SWPPP.
  - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
  - 2. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
  - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from the project site during the course of the project.
  - 4. After final stabilization of the site, remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- B. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- C. Contractor shall limit where practical surface area of erodible earth material exposed by clearing and grubbing, excavation, and embankment operations. Contractor shall provide immediate permanent or temporary pollution control measures.
- D. Provide permanent erosion control measures at earliest practical time to minimize requirement for temporary erosion controls. Permanently seed and mulch cut slopes as excavation proceeds.
- E. Maintain temporary erosion control systems installed by Contractor to control siltation at all times throughout Work. Provide maintenance or additional Work within 48 hours of notification by Architect or other governing entities.
- F. Seed and mulch slopes that may be easily eroded. Application of temporary or permanent stabilization must be initiated within 14 days (7 days for slopes greater than 35%) to disturbed areas of a site where construction activities have temporarily or permanently ceased.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A Soil treatment for termite control.
- B Borate treatment for any new and existing structural wood members for termite control.

1.02 RELATED DOCUMENTS

- A Applicable provisions of the General Conditions, Supplementary Conditions, and Division 01, General Requirements.

1.03 SUBMITTALS

- A. Product Data: Submit general information, MSDS and EPA-Registered Label for all products.
- B. Product Certificates: For termite control products, signed by product manufacturer.
- C. Qualification Data: For Installer of termite control products.
- D. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's record information, including the following:
  - 1. Date and time of application.
  - 2. Moisture content of soil before application.
  - 3. Brand name and manufacturer of termiticide.
  - 4. Quantity of undiluted termiticide used.
  - 5. Dilutions, methods, volumes, and rates of application used.
  - 6. Areas of application.
  - 7. Water source for application.
- E. Wood Treatment Application Report: After application of borate is completed, submit report for Owner's record information, including the following:
  - 1. Date and time of application.
  - 2. Brand name and manufacturer of borate.
  - 3. Quantity of undiluted borate used.
  - 4. Dilutions, methods, volumes, and rates of application used.
  - 5. Areas of application.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located, and who employs workers trained and approved by bait-station system manufacturer to install manufacturer's products.
- B. Regulatory Requirements: Formulate and apply termiticides according to the EPA-Registered Label.
- C. Source Limitations: Obtain termite control products from a single manufacturer for each product.

1.05 PROJECT CONDITIONS

- A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

1.06 SEQUENCING AND SCHEDULING

- A. Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.
- B. Apply borate treatment after framing, sheathing, and exterior weather protection is completed but before electrical and mechanical systems are installed.

1.07 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
  - 1. Warranty Period: **Five** years from date of Substantial Completion.

1.08 MAINTENANCE SERVICE

- A. Continuing Service: Beginning at Substantial Completion, provide 12 months' continuing service including monitoring, inspection, and re-treatment for occurrences of termite activity. Provide a standard continuing service agreement. State services, obligations, conditions, and terms for agreement period; and terms for future renewal options.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Termiticides:
    - a. Aventis Environmental Science USA LP; Termidor.
    - b. Bayer Corporation; Premise 75 / Centerfire 75 WSP.
    - c. Dow AgroSciences LLC; Dursban TC orEquity.
    - d. FMC Corporation, Agricultural Products Group; Talstar, Prevail FT, Torpedo.
    - e. Syngenta; Demon TC.
    - f. Substitutions: See Section 01 25 00 – Substitution Procedures.
  - 2. Borates:
    - a. Nisus Corp.; Bora-Care, Jecta.
    - b. NovaGuard Technologies, Inc.; Armor-Guard, Shell-Guard.
    - c. U.S. Borax Inc.; Tim-Bor.
    - d. Substitutions: See Section 01 25 00 – Substitution Procedures.

2.02 SOIL TREATMENT

- A. Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.

2.03 WOOD TREATMENT

- A. Borate: Provide an EPA-registered borate complying with requirements of authorities having jurisdiction, in an aqueous solution for spray application and a gel solution for pressure injection, formulated to prevent termite infestation in wood. Provide quantity required for application at the label volume and rate for the maximum diffusible borate concentration allowed for each specific use, according to product's EPA-Registered Label.

### PART 3 EXECUTION

#### 3.01 GENERAL

- A. Perform application only after excavation, filling and grading operations are completed except as otherwise required in construction operations.
- B. Do not perform soil treatment to frozen or excessively wet soil, or during inclement weather.

#### 3.02 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control.
  - 1. Proceed with application only after unsatisfactory conditions have been corrected.

#### 3.03 PREPARATION

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparation before beginning application of termite control treatment. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.
- B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.
  - 1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

#### 3.04 APPLICATION, GENERAL

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

#### 3.05 APPLYING SOIL TREATMENT

- A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.
  - 1. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
  - 2. Foundations: Adjacent soil including soil along the entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating the slab, and around interior column footers, piers, and chimney bases; also along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
  - 3. Masonry: Treat voids.
  - 4. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.
- B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
- C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

- D. Post warning signs in areas of application.
- E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

3.06 APPLYING BORATE TREATMENT

- A. Application: Mix wood treatment borate solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of borate, according to manufacturer's EPA-Registered Label, so that wood framing, sheathing, siding, and structural members subject to infestation receive treatment.
  - 1. Framing and Sheathing: Apply borate solution by spray to bare wood for complete coverage.
  - 2. Wood Members Thicker Than 4 Inches (100 mm): Inject borate gel solution under pressure into holes of size and spacing required by manufacturer for treatment.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

- A. Furnish all labor, material, equipment and services, including inspection, to install bituminous paving where shown on the drawings.
- B. Pricing shall be based on the Tennessee Department of Transportation Bituminous Index Current at the time bids are received. Actual pricing for Asphalt Paving shall be adjusted based on the Bituminous Index at the time of start of paving work.

1.02 RELATED DOCUMENTS

- A. Applicable drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 sections.
- B. Section 31 20 00 - Earthwork
- C. Section 03 30 00 - Concrete

1.03 REFERENCES

- A. ASTM International:
  - 1. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.
  - 2. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Binder for Use in Pavement Construction.
  - 3. ASTM D2041 - Standard Test Method for Theoretical Maximum Specific Gravity and Density of Asphalt Mixtures.
  - 4. ASTM D3381 - Standard Specification for Viscosity-Graded Asphalt Binder for Use in Pavement Construction.
  - 5. ASTM D3549 - Standard Test Method for Thickness or Height of Compacted Asphalt Mixture Specimens.
- B. Tennessee Department of Transportation (TDOT):
  - 1. TDOT - Standard Specifications for Road and Bridge Construction.

1.04 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification sections.
- B. Material Certificates signed by material producer and Contractor, certifying that each material item complies with or exceeds specified requirements.

1.05 QUALITY ASSURANCE

- A. Comply with City Highway Department standards for work in relation to city streets.
- B. Testing:
  - 1. If the Architect suspects that the paving does not conform to the thicknesses specified he may require the Contractor to make up to six (6) test cores be taken in locations of his determination. If test cores indicate non-compliance with the specifications, the areas in nonconformance shall be replaced. If the initial tests indicate non-compliance with the specifications, additional test cores will be required. The number and location of tests to be as directed by the Architect. Patch all test core locations.
    - a. Thickness: In-place compacted thickness tested in accordance with ASTM D 3549 will not be acceptable if exceeding following allowable variations:

- i. Binder Course: Plus or minus 1/2-inch.
  - ii. Finish Course: Plus or minus 1/4-inch.
- C. Surface Smoothness: Test finished surface of each hot-mixed asphalt course for smoothness, using 10-foot straightedge applied parallel with and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness:
  - 1. Base Course Surface: 1/4-inch.
  - 2. Wearing Course Surface: 3/16-inch.
  - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4-inch.
- D. Check surface areas at intervals as directed by the Architect.
- E. Conformance with Grades and Drainage: Compare paved surfaces to grades as shown on the Construction Documents. Surface shall conform with slopes indicated on the documents and shall be free draining with no impounded areas. Provide tape measure and construction level to verify slopes questioned by Architect. Provide water hose and water supply for drainage testing.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. General: Use locally available materials and gradations that exhibit a satisfactory record of previous installations.
- B. Asphalt Cement: ASTM D3381 for viscosity-graded material; ASTM D946 for penetration-graded material.
- C. Aggregate Base Course:
  - 1. Base course material shall consist of crushed limestone meeting the requirements of the Tennessee Department of Transportation (TDOT) Standard Specifications for Road and Bridge Construction, Section 303 – Mineral Aggregate Base, for Type “A” base, Class “A” aggregates, utilizing aggregate gradation “D”.
- D. Asphalt Binder Course:
  - 1. The asphalt binder course shall meet the specifications of Tennessee Department of Transportation (TDOT) Standard Specifications for Road and Bridge Construction, Section 307 - Bituminous Plant Mix Base. The aggregates for the mixture shall meet the requirements for grading B Modified.
- E. Finishing Course:
  - 1. Hot-mix bituminous paving finish course shall meet the provisions of Tennessee Department of Transportation (TDOT) Standard Specifications for Road and Bridge Construction, Section 411-Asphaltic Concrete Surface (Hot Mix), (Grading E).
  - 2. Bitumen content shall be adequate to produce durable, water repellent surfaces, but not so great as to create undesirable bleeding.
- F. Traffic and Lane Marking Paint: Chlorinated-rubber base traffic lane marking paint, factory-mixed, quick-drying, and non-bleeding.
- G. Concrete for machine run concrete curbs is specified in Section 03 30 00 Cast-in-Place Concrete.
- H. Wheel Stops: Recycled Rubber, approximately 4 inches high 6 inches wide, and 72 inches long, guaranteed against breakage for minimum of 10 years, with molded-in reflective yellow tape.

### PART 3 EXECUTION

#### 3.01 SITE CONDITIONS

- A. Construct hot-mixed asphalt surface course when atmospheric temperature is above 40° F (4° C) and when base is dry. Base course may be placed when air temperature is above 30° F (minus 1° C) and rising.
- B. Grade Control: Establish and maintain required lines and elevations.

#### 3.02 MATERIALS PLACEMENT

- A. Do all additional grading and trimming required to bring subgrades to required elevations and profiles and compact thoroughly by rolling.
- B. Proof-roll prepared sub-base surface to check for unstable areas and areas requiring additional compaction in the presence of the Geotechnical Engineer.
- C. Over the properly prepared subgrade, install a crushed stone base to a compacted minimum thickness as noted on the drawings or of not less than 6 inches at regular duty paving and 8 inches at heavy duty paving.
- D. Properly shape and thoroughly compact base course by rolling until the surface does not weave under the roller. Base shall be compacted to a minimum of 100 percent of its maximum dry density as determined by Standard Proctor Test ASTM D698.
- E. Exercise care in applying bituminous materials to avoid smearing of adjoining concrete surfaces. Remove and clean damaged surfaces.
- F. Placing Mix:
  - 1. General: Place hot-mixed asphalt mixture on prepared surface, spread, and strike off. Spread mixture at minimum temperature of 225° F (107° C). Place areas inaccessible to equipment by hand. Place each course to required grade, cross-section, and compacted thickness.
  - 2. Binder Course: After the base course has been properly prepared, apply a binder course of hot plant mix asphaltic concrete to a compacted minimum thickness as noted on the drawings or of not less than 2-1/2 inches at heavy duty paving; whichever is greater. Not less than 2 inches at regular duty paving. Properly shape and thoroughly compact the binder course to a minimum of 92 percent of Maximum Theoretical Density (MTD).
  - 3. Finish Course: Finish course shall be installed to a compacted minimum thickness as noted on the drawings or 1 inch at regular duty paving and 1-1/2 inches at heavy duty paving. Properly shape and thoroughly compact finish course to a minimum of 92 percent of Maximum Theoretical Density (MTD).
  - 4. Paver Placing: Place in strips not less than 10 feet wide, unless otherwise acceptable to the Architect. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete base course for a section before placing surface course.
  - 5. Immediately correct surface irregularities in finish course behind paver. Remove excess material forming high spots with shovel or lute.
  - 6. Joints: Make joints between old and new pavements, or between successive days work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density, and smoothness as other sections of hot-mixed asphalt course.
- G. Curbs: Construct concrete curbs over compacted binder course surfaces.
- H. Place curb materials to cross-section indicated by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish.
- I. Rolling:
  - 1. General: Begin rolling when mixture will bear roller weight without excessive displacement.
  - 2. Compact mixture with hot hand tampers or vibrating place compactors in areas inaccessible to rollers.

3. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling and repair displaced areas by loosening and filling, if required, with hot material.
4. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been evenly compacted.
5. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained a minimum of 92 percent laboratory density, maximum theoretical density as determined by ASTM D2041.
6. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot-mixed asphalt. Compact by rolling to specified surface density and smoothness.
7. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
8. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

### 3.03 TRAFFIC AND LANE MARKINGS

- A. Cleaning: Sweep and clean surface to eliminate loose material and dust.
- B. Do not apply traffic and lane marking paint until layout and placement have been verified by the Architect.
- C. Apply paint with mechanical equipment to produce uniform, straight edges. Apply at manufacturer's recommended rates to provide minimum 12 to 15 mils dry thickness. Lot striping shall be painted with stripes 4 inches wide.
  1. Color to be White for standard striping.
  2. Color to be Blue for handicapped parking symbols.
  3. Color for fire lanes shall be coordinated with local Fire Department.

### 3.04 RUBBER WHEEL STOPS

- A. Anchor to asphalt using manufacturer's written installation instructions, and manufacturer's recommended hardware.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Bituminous paving repair, including patching, crack and joint filling, and tack coat.
- B. Traffic and lane markings.
- C. Wheel stops.

1.02 RELATED SECTIONS

- A. Applicable drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections.
- B. Section 31 20 00 – Earthwork.
- C. Section 03 30 00 – Concrete.

1.03 REFERENCES

- A. AASHTO
  - 1. AASHTO M 140 – Standard Specification for Emulsified Asphalt.
  - 2. AASHTO MP 24 - Standard Specification for Waterborne White and Yellow Traffic Paints.
- B. ASTM International
  - 1. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Binder for Use in Pavement Construction.
  - 2. ASTM D977 - Standard Specification for Emulsified Asphalt.
  - 3. ASTM D2397 - Standard Specification for Cationic Emulsified Asphalt.
  - 4. ASTM D3381 - Standard Specification for Viscosity-Graded Asphalt Binder for Use in Pavement Construction.
  - 5. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
- C. Tennessee Department of Transportation (TDOT):
  - 1. TDOT - Standard Specifications for Road and Bridge Construction.

1.04 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification sections.
- B. Material Certificates signed by material producer and Contractor, certifying that each material item complies with or exceeds specified requirements.

1.05 QUALITY ASSURANCE

- A. Comply with City Highway Department standards for work in relation to city streets.
- B. Demonstrate drainage of finished paving to Architect through the application of sprayed water to verify complete drainage and the absence of “bird baths”.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General: Use locally available materials and gradations that exhibit a satisfactory record of previous installations.

- B. Asphalt Cement: ASTM D3381 for viscosity-graded material; ASTM D946 for penetration-graded material.
- C. Tack Coat: ASTM D977 or AASHTO M 140 emulsified asphalt as required. ASTM D 2397 or AASHTO M 208 cationic emulsified asphalt as required, slow setting, diluted in water, of suitable grade and consistency for application.
- D. Joint Sealant: ASTM D6690, Type I hot-applied, single-component, polymer-modified bituminous sealant.
- E. Asphalt Binder Course: meet the specifications of TDOT, Section 307, Bituminous Plant Mix Base. The aggregates for the mixture shall meet the requirements for grading B Modified.
- F. Finishing Course:
  - 1. Hot-mix bituminous paving finish course shall meet the provisions of TDOT, Section 411 (Grading E).
  - 2. Bitumen content shall be adequate to produce durable, water repellent surfaces, but not so great as to create undesirable bleeding.
- G. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with AASHTO MP 24, Type F; colors complying with FS TT-P-1952.
- H. Concrete for machine run concrete curbs is specified in Section 03 30 00 – Cast-in-Place Concrete.
- I. Wheel Stops: Recycled Rubber, approximately 4 inches high 6 inches wide, and 72 inches long, guaranteed against breakage for minimum of 10 years, with molded-in reflective yellow tape.

#### PART 3 EXECUTION

##### 2.01 SITE CONDITIONS

- A. Construct hot-mixed asphalt surface course when atmospheric temperature is above 40° F (4° C) and when base is dry. Base course may be placed when air temperature is above 30° F (minus 1° C) and rising.
  - 1. Tack Coat: Minimum surface temperature of 60 deg F (15.6 deg C).
- B. Grade Control: Establish and maintain required lines and elevations.
- C. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of [40 deg F (4.4 deg C) for oil-based materials] [55 deg F (12.8 deg C) for water-based materials], and not exceeding 95 deg F (35 deg C).

##### 3.02 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Repairs: Remove paved areas that are defective or contaminated with foreign materials
  - 1. Pothole patching: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- C. Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces by power-brooming. Ensure that prepared subgrade is ready to receive paving.

##### 3.03 MATERIALS PLACEMENT

- A. Exercise care in applying bituminous materials to avoid smearing of adjoining concrete surfaces. Remove and clean damaged surfaces.

- B. Repairs:
1. Patching: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.
  2. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a minimum depth of 1/4 inch (6 mm) unless indicated otherwise on drawings.
    - a. Clean cracks and joints in existing hot-mix asphalt pavement.
    - b. Use emulsified-asphalt slurry to seal cracks and joints less than 1/4 inch (6 mm) wide. Fill flush with surface of existing pavement and remove excess.
    - c. Use hot-applied joint sealant to seal cracks and joints more than 1/4 inch (6 mm) wide. Fill flush with surface of existing pavement and remove excess.
- C. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).
1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
  2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- D. Placing Mix:
1. General: Machine place hot-mixed asphalt mixture on prepared surface, spread uniformly and strike off. Spread mixture at minimum temperature of 225° F (107° C). Place areas inaccessible to equipment by hand. Place each course to required grade, cross-section, and compacted thickness.
    - a. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
    - b. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
  2. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt binder course to level sags and fill depressions deeper than 1 inch (25 mm) in existing pavements.
    - a. Install leveling wedges in compacted lifts not exceeding 3 inches (75 mm) thick.
  3. Finish Course: Finish course shall be installed to a compacted minimum thickness as noted on the drawings but not less than 1-1/2".
  4. Paver Placing: Place in strips not less than 10 feet side, unless otherwise acceptable to the Architect. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete base course for a section before placing surface course.
  5. Immediately correct surface irregularities in finish course behind paver. Remove excess material forming high spots with shovel or lute.
  6. Joints: Make joints between old and new pavements, or between successive days work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density, and smoothness as other sections of hot-mixed asphalt course.
- E. Joints: Ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
1. Clean contact surfaces and apply tack coat to joints.
  2. Offset longitudinal joints, in successive courses, a minimum of 6 inches (150 mm).
  3. Offset transverse joints, in successive courses, a minimum of 24 inches (600 mm).
  4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
  5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
  6. Compact asphalt at joints to a density within 2 percent of specified course density.
- F. Curbs: Construct concrete curbs over compacted binder course surfaces unless indicated otherwise on drawings.
- G. Place curb materials to cross-section indicated by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish.

- H. Rolling:
1. General: Begin rolling when mixture will bear roller weight without excessive displacement.
  2. Compact mixture with hot hand tampers or vibrating place compactors in areas accessible to rollers.
  3. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling and repair displaced areas by loosening and filling, if required, with hot material.
  4. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been evenly compacted.
  5. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained a minimum of 92 percent laboratory density, maximum theoretical density as determined by ASTM D 2041, but not less than 90 percent nor greater than 96 percent.
  6. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot-mixed asphalt. Compact by rolling to specified surface density and smoothness.
  7. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
  8. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

#### 3.04 TRAFFIC AND LANE MARKINGS

- A. Cleaning: Sweep and clean surface to eliminate loose material and dust.
- B. Do not apply traffic and lane marking paint until layout and placement have been verified with the Architect.
- C. Apply paint with mechanical equipment to produce uniform, straight edges. Apply at manufacturer's recommended rates to provide minimum 12 to 15 mils dry thickness. Lot striping shall be painted with 4" wide stripes.
1. Color: White (Blue for Handicapped Parking Symbols)

#### 3.05 RUBBER WHEEL STOPS

- A. Secure wheel stops to pavement with galvanized steel dowels.

#### 3.06 FIELD QUALITY CONTROL

- A. Testing: If the Architect suspects that the paving does not conform to the thicknesses specified he may require up to six (6) test cores be taken in locations of his determination. If test cores indicate non-compliance with the specifications, the areas in nonconformance shall be replaced. If the initial tests indicate non-compliance with the specifications, additional test cores will be required. The number and location of tests to be as directed by the Architect. Patch all test core locations.
- B. Thickness: In-place compacted thickness tested in accordance with ASTM D 3549 will not be acceptable if exceeding following allowable variations:
1. Binder Course: Plus or minus 1/2-inch.
  2. Finish Course: Plus or minus 1/4-inch.
- C. Surface Smoothness: Test finished surface of each hot-mixed asphalt course for smoothness, using 10-foot straightedge applied parallel with and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness:
1. Base Course Surface: 1/4-inch.
  2. Wearing Course Surface: 3/16-inch.
  3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4-inch.

4. Check surface areas at intervals as directed by the Architect.
- D. Conformance with Grades and Drainage: Compare paved surfaces to grades as shown on the Construction Documents. Surface shall conform with slopes indicated on the documents and shall be free draining with no impounded areas. Provide tape measure and construction level to verify slopes questioned by Architect. Provide water hose and water supply for drainage testing.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete Paving.
- B. Concrete Curbs.

1.02 RELATED SECTIONS

- A. Section 31 20 00 – Earthwork.
- B. Section 32 11 00 - Asphalt Paving.

1.03 REFERENCES

- A. AASHTO - American Association of State Highway and Transportation Officials:
    - 1. AASHTO M182
  - B. ACI - American Concrete Institute:
    - 1. ACI 117 – Specification for Tolerances for Concrete Construction and Materials.
    - 2. ACI 301 – Specifications for Structural Concrete.
  - C. ASTM International:
    - 1. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
    - 2. ASTM A767 - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
    - 3. ASTM A1064 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
    - 4. ASTM C33- Standard Specification for Concrete Aggregates.
    - 5. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
    - 6. ASTM C150 – Standard Specification for Portland Cement.
    - 7. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.
    - 8. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
    - 9. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
    - 10. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
    - 11. ASTM C618 – Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
    - 12. ASTM C989 - Standard Practice for Use of Sealants in Acoustical Applications.
    - 13. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete.
    - 14. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types).
    - 15. ASTM D1752 - Standard Specification for Preformed Sponge Rubber, Cork, and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
  - D. CRSI – Concrete Reinforcing Steel Institute:
    - 1. Manual of Standard Practice.
- 1.04 SUBMITTALS
- A. Submit product data for the following:
    - 1. Fiber reinforcement.
    - 2. Expansion joint filler.
    - 3. Curing compound.
    - 4. Joint sealant.

- 5. High-range water-reducing admixture.
- B. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Submit fiber reinforcement manufacturer's batching and mixing instructions.
- D. Submit certificate prepared by the concrete supplier stating that the approved fiber reinforcement materials were added in the proper proportions to each batch of concrete. Submit batch delivery ticket indicating fiber reinforcement quantity.
- E. Submit under provisions of Section 01 30 00.

1.04 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
- B. ACI Publications: Comply with ACI 301 (ACI 301M) unless otherwise indicated.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. For each product, one of the listed manufacturers.
- B. Fiber Reinforcement:
  - 1. Forta Corporation.
  - 2. Fibermesh Company.
  - 3. Durafiber Group.
- C. Curing Compound:
  - 1. Sonneborn Building Products.
  - 2. Euclid Chemical Co.
  - 3. W.R. Meadows.
  - 4. L&M Construction Chemicals.
  - 5. W.R. Grace Construction Products.
- D. Joint Sealant:
  - 1. Sonneborn Building Products.
  - 2. Pecora Corporation.
  - 3. Tremco.
- E. High-Range Water-Reducing Admixture:
  - 1. Master Builders.
  - 2. Euclid Chemical Co.
  - 3. Sika Chemical Company.
  - 4. Chem-Masters Corp.
  - 5. W.R. Grace Construction Products.
- F. No substitutions, except under provisions of Section 01 25 00.

2.02 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Reinforcement: ASTM A1064/A1064M – 6x6, fabricated from as-drawn steel wire into flat sheets.
- B. Deformed-Steel Welded Wire Reinforcement: ASTM A1064/A1064M, flat sheet.
- C. Reinforcing Bars: ASTM A615/A615M, Grade 60 (Grade 420); deformed.
- D. Plain-Steel Wire: ASTM A1064/A1064M, as drawn.
- E. Deformed-Steel Wire: ASTM A1064/A1064M.
- F. Dowel Bars: ASTM A615/A615M, Grade 60 (Grade 420) plain-steel bars; zinc coated (galvanized) after fabrication according to ASTM A767/A767M, Class I coating. Cut bars true to length with ends square and free of burrs.
- G. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified.

2.03 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
  - 1. Portland Cement: ASTM C150, gray portland cement.
    - a. Fly Ash: ASTM C618.
    - b. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120.
  - 2. Blended Hydraulic Cement: ASTM C595.
- B. Normal-Weight Aggregates: ASTM C33 uniformly graded. Provide aggregates from a single source.
- C. Water: Potable and complying with ASTM C94/C94M.
- D. Air-Entraining Admixture: ASTM C260.
- E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

2.04 FIBER REINFORCEMENT

- A. Synthetic Fiber: Monofilament or fibrillated polypropylene fibers engineered and designed for use in concrete paving, complying with ASTM C1116/C1116M, Type III.

2.05 CURING MATERIAL

- A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry or cotton mats.
- B. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, dissipating.

- F. White, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 2, Class B, dissipating.

2.06 RELATED MATERIALS

- A. Joint Fillers: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752 – limestone color.
- B. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.

2.07 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301 (ACI 301M), with the following properties:
1. Compressive Strength (28 Days): 4000 psi (27.6 MPa).
  2. Cement Content: 560 lbs. per cu. yd. minimum
  3. Coarse Aggregate: 1 1/2" maximum size.
  4. Slump Limit: 4 inches (100 mm).
  5. Air Content: 5 percent.
- B. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
- C. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than [1.5 lb/cu. yd.

2.08 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C 94M and ASTM C1116/C1116M. Furnish batch certificates for each batch discharged and used in the Work.

2.09 SOURCE QUALITY CONTROL

- A. Testing will be performed under provisions of Section 01 40 00.
- B. Test concrete for:
1. Compressive strength.
  2. Slump.
  3. Air content.
- C. Perform number of tests and follow testing procedures in accordance with ASTM C94.

2.10 MACHINE-FORMED CURBS

- A. Curb: Profile to match Stephens-Canfield Mold T-2, or as per county highway department.

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Ensure compacted subgrade is proper to support paving.
- B. Ensure gradients and elevations of subgrade are correct.
- C. Proof roll prepared subgrade to check for unstable areas and areas requiring additional compaction.
- D. Do not begin paving work until deficient subgrade areas have been corrected and are ready to receive paving.

- E. Remove loose material from compacted subbase surface immediately before placing concrete.
- F. Dampen subgrade with water prior to concreting to minimize absorption of water from fresh concrete.
- G. Do not place concrete over standing water, or muddy or soft spots.

### 3.02 EDGE FORMS AND SCREED CONSTRUCTION

- A. Construct to maintain tolerances and prevent movement from pressure of concrete or impact of finishing equipment.
- B. Set forms to required grades and lines, within following tolerances:
  - 1. Top of forms not more than 1/8" in 10 ft.
  - 2. Vertical face not more than 1/4" in 10 ft.
- C. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- D. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

### 3.03 SETTING REINFORCEMENT

- A. Place reinforcement at mid-height of slabs. Interrupt reinforcement at expansion joints.
- B. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

### 3.04 JOINTS

- A. Provide expansion or isolation joints between pavement and building, curb, and other fixed objects.
  - 1. Provide other expansion joints as shown on the drawings.
  - 2. Provide thickened edge each side of joint. Provide joint filler full depth of slab; place top 1/2" below finished surface.
  - 3. Where indicated as doweled joint, omit thickened edge and provide 3/4" dowels, 14" long, 12" o.c. Lubricate one half of length and provide dowel expansion cap.
- B. Provide longitudinal construction joints at edges of paving lines as shown on the drawings.
  - 1. Where indicated as tied joint, provide butt joint formed bulkhead with No. 4 tie bars, 30" long, 30" o.c.
  - 2. Provide keyway joints at other locations.
- C. Provide transverse construction joints at end of placement and at locations where placement is stopped for a period of more than 1/2 hour, other than at expansion joints.
  - 1. Where joints occur at planned control joint locations, provide butt joint formed bulkhead with 3/4" dowels, 14" long, at 12" o.c. Lubricate one half of length.
  - 2. At other locations, provide keyway joint with No. 4 tie bars, 30" long, 30" o.c.
- D. Provide control, or contraction, joints to section concrete into areas shown on the drawings.
  - 1. Joints may, at Contractor's option, be formed by hand, or sawed.
- E. After initial floating, tool edges of paving, gutters, curbs and joints in concrete with an edging tool to a 3/8" radius. Repeat tools of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.
- F. Clean joints more than 1/4" wide and fill with sealant.

3.05 CONCRETE PLACEMENT

- A. Moisten subbase to provide a uniform dampened condition at time concrete is placed.
- B. Comply with ACI requirements for measuring, mixing, transporting, placing, and consolidating concrete.
- C. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- D. Screed paving surface with a straightedge and strike off.
- E. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- F. Place machine formed curbs over pavement aggregate base by automatic machine.
- H. Provide expansion joints in cast-in-place curbs at same locations as joints in adjacent walk.

3.06 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
  - 1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
- C. Slip-Resistive Aggregate Finish: Before final floating, spread slip-resistive aggregate finish on paving surface according to manufacturer's written instructions.
  - 1. Cure concrete with curing compound recommended by slip-resistive aggregate manufacturer. Apply curing compound immediately after final finishing.
  - 2. After curing, lightly work surface with a steel wire brush or abrasive stone and water to expose nonslip aggregate.
- D. Trowel top and face of curb. Provide a final fine brush finish to top and face of curb with brush strokes parallel to line of curb.

3.07 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound or a combination of these.

- F. Exclude all foot traffic from pavement for at least 3 days and exclude truck traffic for at least 14 days after placement or as necessary to maintain integrity of finish.

3.08 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
1. Elevation:  $3/4$  inch.
  2. Thickness: Plus  $3/8$  inch, minus  $1/4$  inch.
  3. Surface: Gap below 10-foot-long, unleveled straightedge not to exceed  $1/2$  inch.
  4. Joint Spacing: 3 inches.
  5. Contraction Joint Depth: Plus  $1/4$  inch, no minus.
  6. Joint Width: Plus  $1/8$  inch, no minus.

3.09 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by project manager.
- B. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- C. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION



PART 1 GENERAL

1.01 SCOPE

- A Riprap slope protection work.

1.02 RELATED SECTIONS

- A Applicable provisions of the General Conditions, Supplementary Conditions, and Division 1, General Requirements.

PART 2 PRODUCTS

2.01 MATERIAL

- A The riprap consists of stone placed on a prepared slope to form a well-graded mass with a minimum of voids. The stone used for riprap shall be hard; durable; angular in shape; resistant to weathering and water action; free from overburden, spoil, shale, and organic material; and shall meet the gradation specified. Neither breadth nor thickness of a single stone should be less than one-third its length. Rounded stone or boulders will not be acceptable. The minimum weight of the stone shall be 155 pounds per cubic foot as computed by multiplying the specific gravity times 62.4 pounds per cubic foot.
- B The stone shape is angular shaped from 6-inch minimum to 12-inch maximum diameter.
- C Riprap shall be reasonably well-graded from the smallest to the maximum size specified. Control of gradation will be by visual inspection.
- D Weed control fabric shall be non-woven polypropylene or polyester fabric, 3 oz per square yard minimum.

PART 3 EXECUTION

3.01 PLACING

- A The stone shall be placed on the site to an average thickness of approximately 12".
- B Rip Rap shall be placed on a layer of landscape fabric designed to inhibit the growth of weeds. Overlap seams of fabric 6 inches minimum. Cover edges of fabric with stone.
- C The riprap shall be so placed and distributed that there will be no large accumulations of either the larger or smaller sized of stone and shall cover the surface entirely.
- D Hand placing or rearranging of individual stones by mechanical equipment may be required to the extent necessary to secure the desired results.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A Tactile warning tile set in concrete surfaces.

1.02 RELATED SECTIONS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.  
1. Section 03 30 00 – Cast-in-Place Concrete.

1.03 SUBMITTALS

- A Product Data: For the following:  
1. Tactile Warning Tile.  
2. Anchorage devices.
- B Samples for Verification:  
1. Full-size units of each type of tactile warning tile indicated.
- C Manufacturer's latest printed installation instructions.
- D Material Test Reports: Submit test reports from qualified independent testing laboratory indicating that materials proposed for use are in compliance with requirements and meet the properties indicated.
- E Maintenance Instructions: Submit copies of manufacturer's specified maintenance practices for each type of tactile tile and accessory required.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of tile, and accessory from one source with resources to provide materials and products of consistent quality in appearance and physical properties.
- B. Installer's Qualifications: Engage an experienced installer qualified for installation, who has successfully completed tile installations similar in material, design, and extent to that indicated for Project.
- C. Americans with Disabilities Act (ADA): Provide tactile warning surfaces which comply with the detectable warnings on walking surfaces section of the following regulatory agencies:  
1. Americans with Disabilities Act (Title 49 CFR TRANSPORTATION, Part 37.9 STANDARDS FOR ACCESSIBLE TRANSPORTATION FACILITIES, Appendix A, Section 4.29.2 DETECTABLE WARNINGS ON WALKING SURFACES. In addition products must comply with CALIFORNIA TITLE 24 requirements regarding patterns, color and sound on cane contact.  
2. 2002 North Carolina Accessibility Code with 2004 Amendments as published by North Carolina Department of Insurance.  
3. ANSI A117.1

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Tiles shall be suitably packaged or crated to prevent damage in shipment or handling. Finished surfaces shall be protected by sturdy wrappings, and shall be identified by model designation or number. Tiles shall be kept dry and away from sources of heat. Store on flat level surface.

1.06 PROJECT CONDITIONS

- A. Pour and finish the concrete according to Section 03 30 00 and information shown on the drawings. Check the slope using the electronic level to be certain that it meets the required standards.

- B. Provide barricades or screens to protect passengers or public and to prevent damage to work.

1.07 EXTRA STOCK

- A. Deliver extra stock to the Owner. Furnish new materials from same manufactured lot as materials installed and enclose in protective packaging with appropriate identification. Furnish not less than two or (10)% of the supplied materials for each type, color and pattern installed.

1.08 WARRANTY

- A. Tiles shall be warranted in writing for a period of five years from date of final completion.

PART 2 PRODUCTS

2.01 TACTILE WARNING TILE (Tile for New Construction)

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to the following:
1. Detectable Warning Systems Inc.
  2. ADA Solutions Inc.
  3. Detectile
  4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Basis-of-Design Product: EZ- Set Composite polymer concrete panels incorporating truncated domes as manufactured by Detectable Warning Systems, Inc.
1. Compressive Strength of tile: 16,000 psi (ASTM C 109)
  2. Tensile Strength of tile: 2083 psi (ASTM 638)
  3. Flexural Strength of tile: 2,300 psi (ASTM D 790)
  4. Slip Resistance Wet/Dry: .79 (ASTM F 1679)
  5. Wear Resistance (ASTM D2486 ) 5000 Cycles- No Wear.
  6. Impact Resistance (ASTM D2794) 60 inch pounds-1/4" indentation- no visible cracking.
  7. Water Absorption (ASTM D570)  
Average % Absorption 2 hour: 0.0  
Average % Absorption 24 hour: 0.0
  8. Freeze/Thaw Cycling (ASTM D1037) 5 cycles No degradation or appearance change.
  9. Salt Spray (ASTM B117) 200 hours – No visible degradation, including spalling, cracking or pitting. Slight spotting.
  10. Chemical & Stain Resistance (ASTM D543/D1308) 54 chemical, commercial and consumer products tested. Range: No effect to severe staining. List of products available.
  11. Shear Bond Strength of panel 500-550 psi.
  12. Color: As selected by the Architect from manufacturer's full range of colors.
- C. Installation Materials: DWS Stainless Steel replaceable concrete anchors.

2.02 TACTILE WARNING MAT (Mat for Existing Construction)

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to the following:
1. Detectable Warning Systems Inc.
  2. ADA Solutions Inc.
  3. Disability Devices Inc.
  4. Equal products of other manufacturers
- B. Polyurethane tactile mat incorporating truncated domes shall conform to the following:
1. Water Absorption of mat when tested by ASTM-D570 not to exceed 0.35% after vacuum.
  2. Compressive Strength-ATM D695-96 5,000 psi
  3. Slip Resistance- ASTM F1679-96 Top of Domes Dry .99

Top of Domes Wet .79  
Surface Dry .82  
Surface Wet .65

4. Impact Resistance ASTM D5420-96 No cracking up to 80 inch pounds
  5. Accelerated Weathering ASTM G154/ASTM D4587 ^E <6.5 after 500 hours
  6. Flexural Strength ASTM 790-96a 13,000 psi
  7. Stain & Chemical Resistance ASTM 1308-87 No Change
  8. Tensile Strength ASTM D412 Not less than 1,100 psi
  9. Hardness of mat when tested to ASTM-D2240: 90 (Shore A).
  10. Specific Gravity of mat when tested to ASTM-D792: 1.22
  11. Weight loss of mat when tested to ASTM- D1044 (Taber Abrasion H-22 Wheel, 1000gms/1000 cycles) 150 mgs.
  12. Color: As selected by the Architect from manufacturer's full range of collors.
- C. Installation Materials: Proprietary sealant/adhesive shall be pre applied over entire back surface of each mat. Protective paper or plastic sheeting must cover entire sealant surface. Do not remove backing until all trimming and placement have been completed and the mats are ready for final installation.
- 2.03 INSTALLATION MATERIALS (Mat for Existing Construction)
- A. Stainless steel concrete screws 3/16" x 1 1/4"
  - B. Nylon finishing washers colored to match mat color.
  - C. Screws to be positioned in the preformed holes at the rate of 6 anchors for each 2' x 4' and 2' X 5' mat, 8 anchors for each 3' x 4' mat and 4 anchors per 2x2 mat.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Examine areas indicated to receive tactile warning tile, with Installer present, prior to commencing concrete placement for compliance with requirements for installation tolerances and other conditions affecting performance.
  1. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.02 INSTALLATION (Tile for New Construction)

- A. Pour and finish the concrete according to the drawings and specifications. Maintain the slump range between 4-6. Check the slope using the electronic level to be certain that it meets the required standards.
- B. Locate- Trace an outline where tiles are to be placed in the wet concrete. This can be done using the point of a trowel. Be certain the placement meets the specifications and drawings for this job.
- C. Insert Anchors – Insert anchor bolts into holes on the tiles and screw on the receiver portion of the anchor on the other side. Tighten securely by holding anchor in place and hand tightening receiver.
- D. Place- Set first tile in place at one end of the traced outline and press into the wet concrete using a wiggling motion. Be careful not to push the tiles too far into the concrete. The edge of the tile should be even and level with the surrounding concrete. Place the second tile next to the first, leaving a 1/2" gap and using the same wiggling motion press it into the wet concrete. Be certain that the second tile is even and level with the first and with the surrounding concrete.
- E. Finish- Trowel concrete flat, remove any excess concrete and leave a 1/2" gap between the tiles. Apply broom finish or other recommended finish to the area immediately surrounding the tiles.
- F. Recheck slope- Recheck the slope using the electronic level, and adjust the tiles if necessary to maintain the required slope specifications.

- G. Do not allow any pressure from walking or other sources to be applied to the E-Z Set tiles during the concrete curing process. (Two days minimum).
- H. Finish-The final step of the process is to sponge, or brush the surface to remove any excess concrete that may have been left on the surface of the Tiles.

3.03 INSTALLATION (Mat for Existing Construction)

- A. Environmental Conditions and Protection: Maintain minimum air and surface temperature of 50 degrees F and rising in spaces to receive tactile mats prior to installations, during installation, and for not less than 2 hours after installation.
- B. Throughout the installation phases of surface preparation and mat setting, ensure that care is taken to prevent damage to any existing work.
- C. Immediately prior to installing the surface applied tactile mats, all surfaces must be inspected to ensure that they are clean, dry, free of voids, curing compounds, projections, loose material, dust, oils, grease, sealers and determined to be structurally sound before the application warning mat. . All new substrate concrete paving must have been cured for at least 28 days prior. If present, all concrete curing compounds shall be removed with sandblasting. The proprietary sealant/adhesive requires that the substrate and the ambient temperature are 50 degree F minimum and rising, and completely dry with no precipitation during 24 hours prior to installation. Assure that sprinklers or other water sources will not be turned on during the installation and adhesive curing process.
- D. Cut and pre-position the mats as shown on the drawings. Inspect the mats and clean all dust and other contaminants from the surfaces to be adhered. Set the mats in place one at a time, true and square, following the manufacturers written instructions.
- E. Carefully remove the paper backing. Use care to avoid peeling the sealant/adhesive from the mat. Place adjoining mats with a 1/8" gap against each other in their pre-laid positions. Press firmly from the center out to remove all trapped air. Using, hand, foot and/or roller apply pressure over the entire surface of the mat to insure complete contact with the concrete substrate.
- F. After the mats have been installed stainless steel concrete screws shall be installed. Drill holes true and straight to the depth required using the recommended bit with holes located by the preformed holes in the mats. Clean dust from the holes to provide clear passage for the anchor. Mechanically fasten tiles to the floor by hand using Phillips screwdriver. Set screws to a depth that will allow the washer to turn. Ensure the fastener has been set to full depth, straight and true.
- G. After fasteners have been set cut the nozzle of the included sealant tube at a 45 degree angle. Apply a smooth, thin bead of sealer around the perimeter (sealer is not required between adjoining mats).
- H. After the mats have been fully installed, and sealer has cured, the surface shall be cleaned, following the recommended maintenance and cleaning procedures.

3.04 CLEANING AND PROTECTING

- A. Protect tiles against damage during construction period to comply with manufacturer's specification.
- B. Protect tiles against damage from rolling loads following installation by covering with plywood.
- C. Clean tiles by method specified by the manufacturer.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Synthetic grass surfacing and infill.
- B. Edge anchoring and borders.
- C. Shock absorbing course.
- D. Correction of grades and subgrade.
- E. Drainage layer.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 31 20 00 – Earthwork.
- C. Section 32 31 13 - Chain Link Fences and Gates.
- D. Section 33 41 00 – Stormwater Collection System.

1.03 REFERENCE STANDARDS

- A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
- B. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
- C. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- D. ASTM C476 - Standard Specification for Grout for Masonry.
- E. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
- F. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN m/m<sup>3</sup>)).
- G. ASTM D6662 - Standard Specification for Polyolefin-Based Plastic Lumber Decking Boards.
- H. ASTM F1292 - Standard Specification for Impact Attenuation of Surfacing Materials Within the Use Zone of Playground Equipment.
- I. ASTM F1487 - Standard Consumer Safety Performance Specification for Playground Equipment for Public Use.
- J. ASTM F1632 - Standard Test Method for Particle Size Analysis and Sand Shape Grading of Golf Course Putting Green and Sports Field Rootzone Mixes.
- K. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
- L. ASTM F1936 - Standard Specification for Impact Attenuation of Turf Playing Systems as Measured in the Field.
- M. ASTM F2898 - Standard Test Method for Permeability of Synthetic Turf Sports Field Base Stone and Surface System by Non-confined Area Flood Test Method.
- N. ASTM STP322-1 - Field Testing of Soils, Chapter 1: Field Percolation Tests for Sanitary Engineering Application.
- O. CPSC Pub. No. 325 - Public Playground Safety Handbook.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. See Section 01 30 00 - Administrative Requirements - Administrative Requirements, for project meetings.
- B. Preinstallation Meeting: Conduct a preinstallation meeting prior to the start of the work of this section; require attendance by all affected installers.

- C. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: For all manufactured surfacing products, provide manufacturer's product data showing materials of construction, compliance with specified standards, installation procedures, and safety limitations.
1. Include STC certifications where required.
  2. Treated Wood Products: Provide information on wood treatment chemical content, toxicity level, and life-cycle durability.
- C. Shop Drawings, Carpet Roll: Show locations of seams and methods of seaming.
- D. Samples: For each product for which color must be selected provide color chart showing full range of colors.
- E. Samples: Provide following prior to ordering material:
1. Synthetic Grass carpet: Two 12 inch by 12 inch (305 mm by 305 mm) pieces.
  2. Infill material: Two 1-gallon bags for each type.
  3. Seamed synthetic grass carpet: Two 12 inch by 24 inch (305 mm by 610 mm) pieces seamed together for each seaming method indicated on drawings.
  4. Shock absorbing material: Two 1-gallon bags for each type.
- F. Percolation Test Report: Describing test method used and results.
- G. Manufacturer's Qualification Statement.
- H. Installer's Qualification Statement.
- I. Maintenance Data:
1. For manufactured surfacing products, provide manufacturer's recommended maintenance instructions and list of repair products, with address and phone number of source of supply.
  2. For loose fill surfacing products, provide detailed re-ordering information to enable Owner to match installed material exactly.
- J. Manufacturer's Field Report.
- K. Topographical survey of loose fill layer prior to installation of synthetic grass carpet.
- L. Certification: Provide IPEMA certification of ASTM F1292 Critical Fall Height at thickness specified.

1.06 QUALITY ASSURANCE

- A. See section 01 40 00 - Quality Requirements, for procedures for testing, inspection, mock-ups, reports, certificates, use of reference standards.
- B. Maintain one copy of latest edition of ASTM F1487 and CPSC Pub. No. 325 at project site.
- C. Manufacturer Qualifications: Company regularly engaged in manufacturing products specified in this section, with not less than three years of documented experience.
1. Surfacing installed in minimum 10 sites and been in successful service minimum 5 years.
  2. Manufacturer's Representative: Provide name, company name and address, and qualifications.
- D. Installer Qualifications: Company certified by manufacturer for training and experience installing protective surfacing; provide installer's company name and address, and training and experience certificate.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store synthetic grass surfacing to project site in accordance with manufacturer's recommendations.
- B. Store materials in dry, covered area, elevated above grade.

1.08 FIELD CONDITIONS

- A. Ambient Conditions: Cease work of this section when:
1. Temperatures are below 55 degrees F.
  2. Humidity levels are above adhesive manufacturer's requirements.
  3. Rain is imminent or falling.
  4. Surfaces are wet or damp.

1.09 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals - Closeout Submittals, for additional warranty requirements.
- B. Provide 10 year minimum warranty from date of substantial completion for materials and installation covering:
1. Excessive wear.
  2. Fiber tensile strength.
  3. Deterioration or fading from UV light.
  4. Seam integrity.
  5. Shock absorption.
  6. Drainage rate.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable products:
1. GameTime, Inc; Synthetic Turf: [www.gametime.com](http://www.gametime.com).
  2. No Fault Sport Group; Synthetic Turf: [www.nofault.com](http://www.nofault.com).
  3. Hanover Specialties Inc; Vturf ST Synthetic Grass Systems: [www.vitriturf.com](http://www.vitriturf.com).
- B. Substitutions: 01 25 00 - Substitution Procedures.

2.02 SYNTHETIC GRASS SURFACING

- A. Synthetic Grass Carpet: Yarn fibers tufted through and adhered to porous fiber backing.
- B. Shock Absorbing Course:
1. Recycled Rubber Fill: Loose fill; 100 percent recycled rubber chips, shreds, granules, or nuggets; installed over subgrade.
    - a. Chip Size: 3/8 inch.
    - b. Depth: As indicated on drawings.

2.03 MATERIALS

- A. Edge Anchoring: Wood-polymer composite lumber complying with ASTM D6662; factory finished, free of sharp vertical edges, protruding elements, and trip hazards, capable of being secured to border.
1. Size(s): 2 inch by 3 inch (51 mm by 76mm).
  2. Minimum Edge Radius: 1/2 inch.
- B. Border: Permanent element surrounding edge anchoring, consisting of exterior walls:
1. Exterior Walls: As indicated on drawings.
  2. Sidewalks: As indicated on drawings.
  3. Precast Concrete Curb: 12 inch wide by 6 inch deep (305 mm by 152 mm), smooth top.
  4. Cast-In-Place Concrete Curb: 12 inch wide by 6 inch deep (305 mm by 152 mm), smooth top. Ready mix concrete in compliance with ASTM C94/C94M.
  5. Concrete Curb: As indicated on drawings.
  6. Rubber Curb: 6 inch wide by 6 inch deep (152 mm by 152 mm).
  7. Chain Link Fence: As indicated on drawings.
- C. Drainage (Loose Surfacing) Course: Fractured, non-rounded gravel; washed; free of dust, clay, dirt, organic material, hazardous substances, or foreign objects; rounded particles, either naturally or mechanically; sieved in compliance with ASTM C136/C136M in specified gradation range.
1. Percent Passing Sieve Size 1/2 inch: 100 percent.

2. Percent Passing Sieve Size 3/8 inch: 75 to 85 percent.
  3. Percent Passing Sieve Size No. 4: 0 percent.
  4. Depth: As indicated on drawings.
- D. Drainage (Base Stone) Course: Fractured, non-rounded gravel; washed; free of dust, clay, dirt, organic material, hazardous substances, or foreign objects; rounded particles, either naturally or mechanically; sieved in compliance with ASTM C136/C136M in specified gradation range.
1. Percent Passing Sieve Size 1-1/2 inch: 100 percent.
  2. Percent Passing Sieve Size 3/4 inch: 75 to 85 percent.
  3. Percent Passing Sieve Size 1/2 inch: 40 to 70 percent.
  4. Percent Passing Sieve Size 3/8 inch: 75 to 85 percent.
  5. Percent Passing Sieve Size No. 4: 0 percent.
  6. Depth: As indicated on drawings.
- E. Drainage Pipes: Uniform material, free of defects:
1. Material: Polyvinyl Chloride.
  2. Material: As indicated on drawings.
  3. Shape: Round.
  4. Shape: As indicated on drawings.
  5. Perforations: As indicated on drawings.
  6. Size: As indicated on drawings.
- F. Geotextile: Nonwoven polypropylene sheet.

#### 2.04 ACCESSORIES

- A. Fasteners, Synthetic Grass to Edging: 1/2 inch (13 mm) stainless steel staples, in compliance with ASTM F1667.
- B. Fasteners, Edging to Border: Self drilling, stainless steel screws, in compliance with ASTM F1667.
- C. Fasteners, Seams:
1. Nails: Galvanized steel, 4 inch (102 mm) long, in compliance with ASTM F1667.
  2. Staples: Galvanized steel, 3/4 inch (19 mm) wide, 4 inch (102 mm) long, in compliance with ASTM F1667.
  3. Sewing Thread: Polyester.
  4. Bonding:
    - a. Adhesive: One-part urethane based glue.
    - b. Backing: 12-inch (305 mm) wide woven polyester.
- D. Rebar: Number 4 rod.
- E. Cementitious Grout: Fine, in compliance with ASTM C476.
- F. Joint Sealant: As recommended by curbing manufacturer, in compliance with ASTM C920.

#### 2.05 SOURCE QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Supply individual components from single source.

### PART 3 EXECUTION

#### 3.01 PREPARATION

- A. Lay out entire project perimeter as indicated on drawings prior to starting work.
- B. Measure location of all synthetic grass elements, including perimeter of existing synthetic grass surfacing, access and egress points, hard surfaces, walls, fences, and structures.
- C. Verify location of underground utilities and facilities in project area. Damage to underground utilities and facilities will be repaired at Contractor's expense.

3.02 SUBGRADE

- A. Excavate unsuitable soils, see Section 31 20 00. Backfill with suitable material, see Section 31 20 00.
- B. Correct irregularities to ensure that required depth of drainage layer can be installed, and elevation is in accordance with manufacturer's requirements.
- C. Remove all obstructions that extend into drainage layer within composite nailer boards.
- D. Perform rough and finish grading, see Section 31 20 00.
- E. Shape to profile indicated on drawings and compact by proof rolling to minimum 95 percent, in compliance with ASTM D698.
- F. Flatness Tolerance: 1/2 inch in 10 feet, maximum.
- G. Perform percolation test at lowest elevation of subgrade, in compliance with ASTM STP322-1.
  - 1. Report results to MBI Companies.
  - 2. If percolation is less than 1 inch in 3 hour period, do not proceed.
- H. Verify that subgrades are at proper elevations and that smooth grading is complete.

3.03 TRENCHING AND BACKFILLING

- A. Lay out trenching for entire drainage network prior to excavation, as indicated on drawings.
- B. Excavate trenches in accordance with drawings.
- C. Mirror base of trenches to finish grade.
- D. Open trenches require presence of daily site activity.
- E. Repair deviations from plans after drainage pipe installation and prior to installing geotextile.
- F. See Section 31 20 00 for trenching.

3.04 DRAINAGE PIPE

- A. Install all piping and fittings as indicated on drawings.
- B. Install collector lines prior to laterals with deepest excavations first.
- C. Connect collector lines to discharge outlet prior to field use.
- D. Completion of installation in accordance to design requires approval by MBI Companies.
- E. See Section 33 41 00 for drainage pipe.

3.05 GEOTEXTILE

- A. Verify that subgrade is free of ruts or protruding objects.
- B. Install geotextile over subgrade in drainage trenches first, prior to field installation.
- C. Lap minimum 36 inches width at seams. Adhere seams in accordance with manufacturer's recommendations.
- D. Install smooth, and free of tensile stresses, folds, or wrinkles.
- E. Protect from clogging, tears, or other damage during surfacing installation.
- F. Repair or replace damaged geotextile in accordance with manufacturer's recommendations.

3.06 DRAINAGE AGGREGATE

- A. Loose Fill Surfacing:
  - 1. Install in compliance with CPSC Pub. No. 325, ASTM F1487, and requirements of authorities having jurisdiction (AHJ).

2. Install aggregate subbase as indicated on drawings. Compact aggregate to maximum 95 percent, in compliance with ASTM D1557.
3. Compact to minimum 95 percent density, in compliance with ASTM D698.
4. Flatness Tolerance: 1/4 inch in 10 feet, maximum.
5. Correct high and low areas in accordance with design drawings.
6. Match top of layer with top of edge anchoring.
7. Prevent base stone from entering into loose fill surfacing layer. Prevent loose fill from entering into base stone layer.
8. Prevent disturbance to geotextile during installation.

B. Base Stone:

1. Install aggregate subbase as indicated on drawings. Compact aggregate to maximum 95 percent, in compliance with ASTM D1557.
2. Install in compliance with CPSC Pub. No. 325, ASTM F1487, and requirements of authorities having jurisdiction (AHJ).
3. Compact to minimum 95 percent density, in compliance with ASTM D698.
4. Flatness Tolerance: 1/2 inch in 10 feet, maximum.
5. Correct high and low areas in accordance with design drawings.
6. Mirror base stone elevations to final elevations.
7. Prevent disturbance to geotextile during installation.
8. Approval of drainage piping by MBI Companies required prior to commencement of installation. Prevent disturbance of drainage piping during installation.

3.07 SHOCK ABSORBING COURSE

A. Recycled Rubber Fill:

1. Install to thickness meeting critical fall heights, as determined by ASTM F1292, or according to drawings.
2. Install in smooth level manner without depressions or rises.
3. Compact until adult foot depressions do not occur.

B. Impact Mats:

1. In Situ Cushion:
  - a. Mix SBR and adhesive mechanically on-site in accordance with manufacturer's directions; do not mix by hand.
  - b. Install in continuous bond; ensure complete bond to subbase.
  - c. Maintain full thickness of resilient layers within Use Zone; cover or abut containment curbs as indicated on drawings; completely cover tapered transition edges.
  - d. Hand trowel exposed surface to smooth, even finish.
  - e. Impact Attenuation Layer: Install entire layer in one continuous pour on same day.
2. Prefabricated Cushion:
  - a. Lay tile with cut end tiles of equal width.
  - b. Bond tile to substrate with adhesive recommended by manufacturer.
  - c. Make cutouts around equipment not more than 3/8 inch in width; remove and refit tile as required to reduce gaps.
  - d. Fill and seal gaps around equipment with sealant.

3.08 EDGE ANCHORING

- A. Layout composite nailer boards. Approval of locations by MBI Companies required prior to installing.
- B. Install along full perimeter of synthetic grass.
- C. Fasten to border with case hardened screws at 24 inch on center, minimum.
- D. Set top of edging flush or recessed 1/2 inch below top of border, maximum.

3.09 BORDER

- A. Verify that site furnishings and composite nailer boards located within project area are complete.
- B. Install border walls according to design drawings.

- C. Sidewalks: Match to top elevation or increase by 1/2 inch above edge anchoring, maximum. See Section 03 30 00 for cast-in-place sidewalks.
- D. Concrete Curb: Install concrete curb in new projects with perimeter fence separating synthetic grass from adjacent areas. Elevate curb 1-1/2 inch higher than outside soil surfaces. Slope top surface outward from synthetic grass. See Section 03 30 00 for cast-in-place curb.
- E. Rubber Curb: Install rubber curb in retrofit projects with perimeter fence separating synthetic grass from adjacent areas. Elevate curb 1-1/2 inch higher than outside soil surfaces. Slope top surface outward from synthetic grass. Install four rebar anchors to each 8 feet length, recessed 1-1/2 inch from top of curb.
- F. Chain Link Fence: Align centerlines of fence and curb. Apply grout to each curb hole installed with fence post, securing post in place. See Section 32 31 13 for chain link fences and gates.

### 3.10 SYNTHETIC GRASS

- A. Carpet Rolls:
  - 1. Unroll all carpet in same direction.
  - 2. Prevent seams from being located over impact mats.
  - 3. Allow carpet to rest for at least 4 hours after unrolling and prior to seaming.
  - 4. Smooth seams and edges, eliminate overlaps and gaps.
- B. Seaming:
  - 1. Cut: Straight, with clean and smooth edge.
  - 2. Method:
    - a. Nailing / Stapling: Spaced 3 inch (76 mm) along seam.
    - b. Sewing: 2 thread, bound seam stitch.
    - c. Bonding: Adhesive-backed, applied uniformly with complete coverage.
    - d. Micromechanical: Utilizing hook-and-loop fasteners.
- C. Securing: Staple carpet to edging 1 inch (25 mm) on center.

### 3.11 INFILL

- A. Apply during dry weather without signs of moisture on synthetic grass.
- B. Thoroughly brush synthetic grass prior to infill installation.
- C. Apply infill uniformly in multiple lifts, brush fibers between each application.
- D. Measure depth to confirm accordance with plans.

### 3.12 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Drainage aggregate completion requires approval by MBI Companies.
- C. Owner or Owner's representative will inspect synthetic grass after installation to verify that surfacing is of proper type and meets specified design safety and accessibility requirements.
- D. Repair or replace rejected work until compliant with specified requirements and design criteria.
- E. Confirm rainfall permeability meets design, per ASTM F2898.
- F. Confirm impact attenuation meets design, per ASTM F1936.
- G. Replace damaged products before Date of Substantial Completion.

### 3.13 CLEANING

- A. Clean surrounding areas of excess construction materials, debris, and waste.
- B. Remove excess and waste material and dispose of off-site in accordance with requirements of authorities having jurisdiction.

C. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

3.14 PROTECTION

A. Protect installed products until Date of Substantial Completion.

B. Restore adjacent existing areas that have been damaged by work of this section.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel chain link fencing.

1.02 RELATED SECTIONS

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.
  - 1. Section 03 30 00- Cast-in-Place Concrete

1.03 SUBMITTALS

- A. Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data in the form of manufacturer's technical data, specifications, and installation instructions for fence and gate posts, fabric, gates, and accessories.
- C. Shop drawings showing location of fence gates, each post, and details of post installation, extension arms, gate swing, hardware, and accessories.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has at least three (3) years experience and has completed at least five chain link fence projects with the same material and scope to that indicated for the Project with a successful construction record of in-service performance.
- B. Single-Source Responsibility: Obtain chain link fence, gates, accessories, fittings, and fastenings from a single source.

1.05 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which Installer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, deterioration of metals, metal finishes, and other materials beyond normal weathering and/or faulty operation of any gate operators and controls.
  - 2. Warranty Period: 5 (five) years from date of Substantial Completion.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify layout information for fences and gates shown on the Drawings in relation to the completed structures. Verify dimensions by field measurements.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Fencing shall be galvanized steel chain link fabric on galvanized steel framework equal to Page Chain Link Fencing as manufactured by Page Fence Division or equal by Stateside Steel & Wire, LLC, American Chain Link Fence or Southeastern Wire. Additional alternate manufacturers must be approved by Architect prior to Bidding and provide product equal to or exceeding specified requirements.

2.02 FABRIC

- A. Galvanized Chain Link Fabric:
  - 1. Fabric shall be knuckled on top selvage and twisted on the bottom selvage with 2 inch mesh of 9 gauge (0.148 inch) wire.

2. Fabric shall be finished as follows: ASTM A392, Class 2 zinc-coated (galvanized) after weaving.
- B. Fabric Height: As indicated on drawings. If not indicated, provide height of 8'-0".

## 2.03 FRAMEWORK

- A. Posts and Other Appurtenances: All posts and other appurtenances used in the construction of this fence shall be Type II round posts; cold-formed, electric-welded steel pipe conforming to heavy industrial requirements of ASTM F 1043 for framing, ASTM F 1083 for Group IC round pipe, and the following:
  1. Group IC, with minimum yield strength of 50,000 psi.
  2. Strength Requirement: Heavy Industrial according to ASTM F 1043.
  3. Post Diameter and Thickness: According to ASTM F 1043.
    - a. Top & Intermediate Rail: 1.66 inches. Manufacturer's longest lengths (17 to 21 feet) with swaged-end or expansion-type coupling, approximately 6 inches long for joining. Provide rail ends or other means for attaching top rail securely to each gate corner, pull and end post.
    - c. Line Post: 2.375 inches.
    - d. End, Corner and Pull Post: 2.875 inches.
    - e. Swing Gate Post: According to ASTM F 900.
  4. Coating for Steel Framing:
    - a. Metallic Coating: Type A, consisting of not less than min. 2.0-oz./sq.ft average zinc coating per ASTM A123/A or 4.0-oz./sq. ft. zinc coating per ASTM A653.
    - b. Polymer coating over metallic coating to provide Vinyl Coated Chain Link Fabric. Color to be selected by Architect from manufacturer's full range, complying with ASTM F934.
- B. Post Spacing: Posts shall be evenly spaced in the line of fence no further apart than 10 feet on center.
- C. Bottom tension wire: Polymer-Coated Steel Wire: 0.177-inch- (4.5-mm-) diameter, tension wire complying with ASTM F 1664, Class 2b over Zn-5-Al-MM-alloy-coated steel wire.
  1. Color: Color to match fence fabric, complying with ASTM F 934.
- D. Tie Wires: 0.166 inch (12-gauge) finish to match fence fabric.
- E. Braces: Brace pipe shall be 1.660 inch o.d. Type II steel pipe, Type C coating inside and outside, weight 1.84 pounds per foot and shall extend from the terminal post to the first adjacent line post. Braces shall fasten to posts by malleable steel fitting.
- F. Tension or Stretcher Bars: Hot dip galvanized steel with a minimum length 2 inches less than the full height of fabric with a minimum cross section of 3/16 inch by 3/4 inch and a minimum of 1.2 oz. of zinc coating per sq. ft. Provide one bar for each gate and end post, and two for each corner and pull post.
- G. Tension and Brace Bands: 3/4 inch wide, 11 gauge, minimum hot dip galvanized steel with a minimum of 1.2 oz. of zinc coating per sq. ft.
- H. Post and Line Caps: Provide weathertight closure cap for each post cap with loop to accept top rail.
- I. Top Rail: 1.66 inches in diameter. Manufacturer's longest lengths (17 to 21 feet) with swaged-end or expansion-type coupling, approximately 6 inches long for joining. Provide rail ends or other means for attaching top rail securely to each gate corner, pull and end post.

## 2.04 GATES

- A. General: Comply with ASTM F 900 for gate posts and single or double swing gate types as indicated on the drawings.
  1. Gate Leaf Width: As indicated on drawings. If not indicated, provide 48" gate(s).
  2. Gate Fabric Height: As indicated on drawings. If not indicated, match adjacent fence height.

- B. Pipe and Tubing:
  - 1. Zinc-Coated Steel: Comply with ASTM F 1043 and ASTM F 1083; protective coating and finish to match fence framing
  - 2. Gate Posts: Round tubular steel.
  - 3. Gate Frames and Bracing: Round tubular steel.
- C. Frame Corner Construction: Welded
- D. Hardware:
  - 1. Hinges: 360-degree inward and outward swing.
  - 2. Latches permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.

#### 2.05 HORIZONTAL-SLIDE GATES

- A. General: Comply with ASTM F 1184 for gate posts and single sliding gate types. Provide automated vehicular gates that comply with ASTM F 2200.
  - 1. Classification: Type II Cantilever Slide, Class 1 with external roller assemblies.
  - 2. Gate Frame Width and Height: As indicated on drawings.
- B. Pipe and Tubing:
  - 1. Zinc-Coated Steel: Protective coating and finish to match fence framing.
  - 2. Gate Posts: Comply with ASTM F 1184. Provide round tubular steel posts.
  - 3. Gate Frames and Bracing: Round tubular steel.
- C. Frame Corner Construction: Welded.
- D. Hardware: Owner- provided.

#### 2.06 GATE OPERATORS

- A. General: Provide factory-assembled automatic operating system designed for gate size, type, weight, and operation frequency. Provide operation control system with characteristics suitable for Project conditions, with remote-control stations, safety devices, and weatherproof enclosures; coordinate electrical requirements with building electrical system.
  - 1. Provide operator designed so motor may be removed without disturbing limit-switch adjustment and without affecting auxiliary emergency operator.
  - 2. Provide operator with UL approval.
  - 3. Provide electronic components with built-in troubleshooting diagnostic feature.
  - 4. Provide unit designed and wired for both right-hand/left-hand opening, permitting universal installation.
- B. Comply with NFPA 70.
- C. UL Standard: Fabricate and label gate operators to comply with UL 325.
- D. Motor Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, within installed environment, with indicated operating sequence, and without exceeding nameplate rating or considering service factor. Comply with NEMA MG 1 and the following:
  - 1. Voltage: 208 - 220 V NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected.
  - 2. Horsepower: 3/4.
  - 3. Enclosure: Manufacturer's standard.
  - 4. Duty: Continuous duty at ambient temperature of 105 deg F (40 deg C) and at altitude of 3300 feet (1005 m) above sea level.
  - 5. Service Factor: 1.15 for open drip-proof motors; 1.0 for totally enclosed motors.
  - 6. Phase: Polyphase.

- E. Gate Operators: Equipment base/pad mounted Mechanical Slide Gate Operators:
1. Duty: Heavy duty, commercial/industrial.
  2. Gate Speed: Minimum 60 feet (18.2 m) per minute variable speed
  3. Maximum Gate Weight: 600 lb (272 kg).
  4. Frequency of Use: Continuous duty
  5. Operating Type: Wheel and rail drive with manual release.
  6. Drive Type: Enclosed worm gear reducers, roller-chain drive.
- F. Remote Controls: Electric controls separated from gate and motor and drive mechanism, with NEMA 3R enclosure for pedestal mounting and with space for additional optional equipment. Provide the following remote-control device(s):
1. Telephone Entry System: Hands-free voice-communication system for connection to building telephone system with digital-entry code activation of gate operator and auxiliary keypad entry.
    - a. Multiunit System: Designed to be wired to a dedicated telephone line, with capacity to access 20 telephones and with electronic directory.
- F. Obstruction Detection Devices: Provide each motorized gate with automatic safety sensor(s). Activation of sensor(s) causes operator to immediately function as follows:
1. Action: Reverse gate in both opening and closing cycles and hold until clear of obstruction.
  2. Internal Sensor: Built-in torque or current monitor senses gate is obstructed.
  3. Photoelectric/Infrared Sensor System: Designed to detect an obstruction in gate's path when infrared beam in the zone pattern is interrupted.
- G. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop gate at fully retracted and fully extended positions.
1. Type: Integral fail-safe release, allowing gate to be pushed open without mechanical devices, keys, cranks, or special knowledge
- H. Operating Features:
1. Digital Microprocessor Control: Electronic programmable means for setting, changing, and adjusting control features with capability for monitoring and auditing gate activity. Provide unit that is isolated from voltage spikes and surges.
  2. Master/Slave Capability: Control stations designed and wired for gate pair operation.
  3. Automatic Closing Timer: With adjustable time delay before closing and timer cut-off switch.
  4. Open Override Circuit: Designed to override closing commands.
  5. Reversal Time Delay: Designed to protect gate system from shock load on reversal in both directions.
  6. Maximum Run Timer: Designed to prevent damage to gate system by shutting down system if normal time to open gate is exceeded.
- I. Accessories:
1. Warning Module: strobe-light alarm sounding three to five seconds in advance of gate operation and continuing until gate stops moving; compliant with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.
  2. Battery Backup System: Battery-powered drive and access-control system, independent of primary drive system.
    - a. Fail Secure: Gate cycles on battery power, then fail safe when battery is discharged.
  3. External electric-powered solenoid lock with delay timer allowing time for lock to release before gate operates.
  4. Fire Box: Provide Knox Padlock No. 3772 as manufactured by Knox Company, Phoenix, AZ, 800-552-5669 for fire department access to fire box.
    - a. Verify acceptability of fire box, padlock and keying with local fire department prior to ordering and installing.
  5. Instructional, Safety, and Warning Labels and Signs: According to UL 325.
  6. Equipment Bases/Pads: Cast-in-place or precast concrete, depth 6 to 12 inches (150 to 300 mm) below frost line or as detailed on drawings, dimensioned and reinforced according to gate-operator component manufacturer's written instructions and as indicated on Drawings.

2.07 MISCELLANEOUS FITTINGS

- A. Furnish all fittings necessary to make a complete installation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet (152.5 m) or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.03 INSTALLATION, GENERAL

- A. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements indicated.
1. Install fencing on established boundary lines inside property line.

3.04 CHAIN-LINK FENCE INSTALLATION

- A. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
- B. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
  2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
  3. Concealed Concrete: Top 2 inches (50 mm) below grade to allow covering with surface material unless detailed otherwise on drawings.
- C. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 30 degrees or more.
- D. Line Posts: Space line posts uniformly at 96 inches (2440 mm) o.c. unless otherwise indicated.
- E. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.
1. Locate horizontal braces at mid-height of fabric 72 inches (1830 mm) or higher, on fences with top rail and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
- F. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch- (3.05-mm-) diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches (610 mm) o.c. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations:
1. Extended along bottom of fence fabric. Install top tension wire through post cap loops. Install bottom tension wire within 6 inches (152 mm) of bottom of fabric and tie to each post with not

less than same diameter and type of wire.

- G. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.
- H. Intermediate Rail: Install and secure to posts with fittings.
- I. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 1 inch (25.4 mm) between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
- J. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches (380 mm) o.c.
- K. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.
  - 1. Maximum Spacing: Tie fabric to line posts at 12 inches (300 mm) o.c. and to braces at 24 inches (610 mm) o.c.
- L. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

### 3.05 GATE INSTALLATION

- A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.
- B. Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Seed.
- B. Commercial fertilizer.
- C. Agricultural limestone.
- D. Mulch material.
- E. Water.
- F. Erosion Control Blanket.
- G. Seed bed preparation, harrowing, compacting and other placement operations.

1.02 RELATED SECTIONS

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 01, General Requirements, apply to the work under this section.

1.03 QUALITY ASSURANCE

- A. Prior to seeding, the Contractor shall furnish to the Architect labels or certified laboratory reports showing the analysis and germination of the seed to be furnished. Acceptance of the seed test reports shall not relieve the Contractor of any responsibility or liability for furnishing seed meeting the requirements of this Section.
- B. In general, seeding operations shall be conducted on all barren areas not covered by structures or pavement; all cleared or grubbed areas which remain as finish grade surfaces; and on all existing turf areas which are disturbed by construction operations, and which are to remain as finish grade surfaces.

1.04 PROJECT CONDITIONS

- A. Protect existing utilities, paving and other facilities from damage caused by seeding operations.
- B. Perform seeding work only after grading and other work affecting ground surface has been completed.
- C. Restrict traffic from lawn areas until grass is established.
- D. Provide hose and lawn watering equipment as required.

1.05 WARRANTY

- A. Provide a uniform stand of grass until the end of the Warranty Period, which is a period of one year from Acceptance of Work by the Owner. Any areas which are designated by the Architect as being unacceptable shall be re-seeded as specified herein until an acceptable stand of grass is established.

PART 2 PRODUCTS

2.01 SEED

- A. Seed shall be delivered in new bags or bags that are sound and labels in accordance with the U.S. Department of Agriculture Federal Seed act.
- B. All seed shall be from the last crop available at the time of purchase and shall not be moldy, wet or otherwise damaged in transit or storage.

- C. Seed shall bear growers analysis testing to a 95 percent minimum purity and 90 percent minimum germination.
- D. Species, rate of seeding, fertilization and other requirement are shown in the seed requirements table:

SEED REQUIREMENTS TABLE  
(Rate per 1000 sq. ft.)

Area	Seed Type	Seed Quantity	Fertilizer	Fertilizer Quantity
Lawn Areas	Kentucky 31 Fescue	5 lbs.	10-10-10	40 lbs.

2.02 FERTILIZER

- A. Container bags shall have the name and address of manufacturer, brand, name weight and chemical composition. Containers shall insure proper protection in handling, transporting and storing the fertilizer.

2.03 LIMING

- A. Limestone shall be a pulverize limestone having a carbonate content of not less than 85% by weight. The limestone shall be crushed so that at least 85% of the material passes a No. 10 mesh screen and 50% passes No. 40 mesh screen. Apply at a rate of 135 lbs. per 1,000 sq. ft.

2.04 MULCH

- A. Mulch shall be one of the following used at the specified rate:
1. Wood Cellulose Fiber 1,500 lbs. per acre
  2. Straw 4,000 lbs. per acre

2.05 WATER

- A. Free of substance harmful to seed growth. Furnished by Contractor. Hoses or other methods of watering furnished by Contractor.

2.06 EROSION CONTROL BLANKET

- A. Wood excelsior blanket reinforced with a photo-degradable plastic grid similar and equal to Curlex Excelsior blanket by the American Excelsior Company or approved equal.

PART 3 EXECUTION

3.01 SEED BED PREPARATION

- A. Before fertilizing and seeding, the surfaces shall be trimmed and worked to true line free from variation, bumps, ridges and depressions, and all foreign materials including roots, rocks and debris removed.
- B. The soil surface to be seeded shall be thoroughly cultivated to a minimum depth of 4 inches with a weighted disk, tiller or other equipment.
- C. If the prepared surface becomes eroded, compacted, or wet due to rain or other occurrence, the surface shall be re-cultivated prior to seeding.
- D. Ground preparation operations shall be preformed only when the ground is in a tillable and workable condition, as determined by the Architect.
- E. Place all topsoil on the site to within finish grade.
- F. Allowance for settlement shall be made.

3.02 FERTILIZER AND LIMING

- A. Following seed bed preparation, fertilizer and lime shall be incorporated at the rates specified herein in the top 2 inches of the soil by disking or other measure.
- B. Fertilizer need not be incorporated in the soil when hydro-seeding is used in seeding operations.

3.03 SEEDING

- A. Examine finish surfaces, grades, topsoil quality and depth. Do not start seeding work until unsatisfactory conditions are corrected.
- B. Seed of the specified group shall be sown as soon as the seed bed preparation is complete. Do not seed during windy conditions.
- C. Seeds shall be uniformly sown by approved mechanical method, preferably a broadcast type spreader. Hydro-seeding is an acceptable method of distribution of seed and fertilizer.
- D. Immediately after sowing by mechanical means, the seed shall be lightly with soil covered by a cultipacker or roller.

3.04 MULCHING

- A. All seeded areas shall be uniformly mulched in a continuous blanket immediately after seeding. Approximately twenty five percent (25%) of the ground surface shall be visible through the mulch blanket. Mulches shall be applied at the rates as specified herein.

3.05 WATERING

- A. Contractor shall be responsible for watering the seeded areas until a satisfactory stand of grass is obtained. Watering shall be done with sprinklers in such a manner as not to cause excessive runoff or erosion.

3.06 INSTALLATION OF EROSION CONTROL BLANKET

- A. Install erosion control blanket on all slopes steeper than 3 run to 1 rise. Install blanket after seed has been placed. Apply blankets vertically to slopes butt ends and sides. Fasten

3.07 HYDROSEEDING

- A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogenous slurry suitable for hydraulic application.
  - 1. Mix Slurry with non-asphaltic tackifier.
  - 2. Apply slurry uniformly to all areas to be seeded in a 1-step process. Apply mulch at the minimum rate of 1,500lb per acre (16.5 kg per 100 sq. m) dry weight but not less than the rate required to obtain specified seed-sowing rate.

3.08 MAINTENANCE

- A. Contractor shall submit typewritten instructions (prior to acceptance) recommending procedures to be established by the Owner for the maintenance of lawns for one full year.
- B. Maintain seeded lawn areas, including watering, spot weeding, mowing, applications of herbicides, fungicides, insecticides, and re-seeding until a full, uniform stand of grass free of weeds, undesirable grass species, disease and insects is achieved and accepted by the Architect.
  - 1. Water daily to maintain adequate surface soil moisture for proper seed germination. Continue daily watering for not less than thirty (30) days. Thereafter apply ½ inch of water twice weekly until acceptance.

2. Repair, rework and re-seed all areas that have washed out, are eroded, or do not catch.
  3. Mow lawn areas as soon as lawn top growth reaches 3 inches high. Cut back to 2 inches high. Repeat mowing as required to maintain specified height.
- C. Maintain seeded banks, ditches, medians and fields to the extent of establishment only. Re-grade and re-seed washed out or eroded areas as required until a suitable cover is established.
- 3.09 SUBSTANTIAL COMPLETION
- A. An inspection of the seeded lawns will be made by the Architect upon request for Application of Substantial Completion by the Contractor
- B. Seeded areas will be acceptable provided all requirements, including maintenance have been complied with, and a healthy, uniform close stand of specified grass is established free of weeds, undesirable grass species, disease, and insects.
- C. No individual lawn areas shall have bare spots or unacceptable cover totaling more than two percent (2%) of the individual areas, in areas requested to be inspected.
- 3.10 CLEANING
- A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, debris, and equipment. Repair damage resulting from seeding operations.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

- A. The work covered by this Section consists of furnishing all labor, equipment and materials required to place seed, commercial fertilizer, and mulch material for temporary grass cover of disturbed soil areas of site. In general, seeding operations shall be conducted on all barren areas not covered by pavement or stone working pad; all cleared or grubbed areas which remain as finish grade surfaces; and on all existing turf areas which are disturbed by construction operations and which are to remain as finish grade surfaces.
- B. The Earthwork Contractor shall be responsible for placing all seeding and other operations as herein specified.

1.02 RELATED DOCUMENTS

- A. Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.

1.03 PROJECT CONDITIONS

- A. Protect existing utilities, paving and other facilities from damage caused by seeding operations.
- B. Perform seeding work only after grading and other work affecting ground surface has been completed to a point where rough grades are established and will remain during building construction.
- C. Restrict traffic from lawn areas until grass is established.
- D. Provide hose and lawn watering equipment as required.

PART 2 PRODUCTS

2.01 SEED

- A. Seed mix shall be 40 percent Kentucky 31 Fescue and 60 percent Annual Rye Grass.
- B. Seed shall be delivered in new bags or bags that are sound and labeled in accordance with the U.S. Department of Agriculture Federal Seed Act.
- C. All seed shall be from the last crop available at the time of purchase and shall not be moldy, wet or otherwise damaged in transit or storage.
- D. Seed shall bear growers analysis testing to a 95 percent minimum purity and 90 percent minimum germination.
- E. Species, rate of seeding, fertilization and other requirements are shown in the seed requirements table:

SEED REQUIREMENTS TABLE

<u>Area</u>	<u>Seed Type</u>	<u>Seed rate per 1,000 sq. ft.</u>	<u>Fertilizer</u>	<u>Fertilizer rate per 1,000 sq. ft.</u>
Exposed soil Areas	Kentucky 31 Fescue and Rye Grass mix	5 lbs.	10-10-10 lbs.	5 lbs.

2.02 FERTILIZER

- A. Commercial fertilizer shall be ready mixed material and shall be 10-10-10.
- B. Container bags shall have the name and address of manufacturer, weight, and chemical composition. Containers shall insure proper protection in handling, transporting, and storing the fertilizer.

2.03 MULCH

- A. Mulch shall be one of the following used at the specified rate:

- 1. Wood Cellulose Fiber      750 lbs. per acre
- 2. Straw                              1,500 lbs. per acre

2.04 WATER

- A. Free of substance harmful to seed growth. Furnished by Contractor. Hoses or other methods of watering furnished by Contractor.

PART 3 EXECUTION

3.01 PREPARATION OF SUBGRADE (if not prepared by General Contractor)

- A. The subsoil shall be graded and uniformly compacted so that it will be parallel but below the proposed finished grade. All subgrade material heavily compacted by construction traffic shall be loosened to a depth of 4 inches.

3.02 FERTILIZER

- A. Following seed bed preparation, fertilizer shall be incorporated at the rates specified herein in the top 2 inches of the soil by disking or other measure.

3.03 SEEDING

- A. Seed of the specified group shall be sown as soon as the seed bed preparation is complete. Do not seed during windy conditions.
- B. Seeds shall be uniformly sown by approved mechanical method, preferably a broadcast type spreader or by hydro seeding. Hydro-seeding is the preferred method of distribution of seed and fertilizer.
- C. Immediately after sowing by mechanical means, the seed shall be covered with mulch.

3.04 MULCHING

- A. All seeded areas shall be uniformly mulched in a continuous blanket immediately after seeding. Approximately 25 percent of the ground surface shall be visible through the mulch blanket. Mulches shall be applied at the rates as specified herein.

3.05 WATERING

- A. Contractor shall be responsible for watering the seeded areas until a satisfactory stand of grass is obtained. Watering shall be done with sprinklers in such a manner as not to cause excessive runoff or erosion.

3.06 HYDROSEEDING

- A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogenous slurry suitable for hydraulic application.
1. Mix Slurry with non-asphaltic tackifier.
  2. Apply slurry uniformly to all areas to be seeded in a 1-step process. Apply mulch at the minimum rate of 1,200 lb per acre (16.5 kg per 100 sq. m) dry weight but not less than the rate required to obtain specified seed-sowing rate.

3.07 MAINTENANCE

- A. Maintain seeded banks, ditches, medians and fields to the extent of establishment only. Re-grade and re-seed washed out or eroded areas as required until a suitable cover is established and for 90 days after substantial completion of the project.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A Soil.
- B Soil Amendments.
- C Mulches.
- D Materials for Plant Support and Protection.
- E Plant Materials.
- F Placing topsoil in all planting areas.
- G Backfilling curbs, walks, and around building.
- H Soil treatment.
- I Planting trees, shrubs and vines.
- J Protection.
- K Maintenance.
- L Guarantee and replacement of plants.

1.02 RELATED SECTIONS

- A Applicable provisions of the General Conditions, Supplementary Conditions and Division 1, General Requirements, apply to the work under this section.
  - 1. Section 32 92 00 – Seeding.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.
  - 1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
  - 2. Experience: Five years' experience in landscape installation in addition to requirements in Division 01 Section "Quality Requirements."
  - 3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
  - 4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:
    - a. Certified Landscape Technician - Exterior, with installation specialty area(s), designated CLT-Exterior.
    - b. Certified Ornamental Landscape Professional, designated COLP.
- B General: Ship landscape materials with certificates of inspection required by governing authorities. Comply with regulations applicable to landscape materials.
- C Do not make substitutions. If specified landscape material is not obtainable, submit proof of non-availability from a minimum of six suppliers to the Designer, together with proposal for use of equivalent material.

- D Analysis and Standards: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery, and while stored at the site. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.
- E Topsoil: Before delivery of topsoil, furnish Designer with written statement giving location of properties which topsoil is to be obtained. Submit laboratory proof of minimum 5 percent organic matter content in topsoil.
- F Trees, Shrubs and Plants: Provide trees, shrubs and plants of quantity, size, genus, species and variety shown and scheduled for landscape work complying with the requirements of ANSI Z60.1 "American Standard for Nursery Stock", and American Association of Nurserymen Standards for Nursery Stock, current edition. Such standards will be considered as MINIMUM ACCEPTABLE and Contractor will be expected to provide plants which can be considered to have a quality which is higher than minimum acceptable.
- G Inspection: The designer may inspect trees and shrubs either at place of growth or at site before planting, for compliance with requirements for genus, species, variety, size and quality. Designer retains the right to further inspect trees and shrubs for size and condition of root ball, insects, injuries and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Rejected material must be immediately removed from the project site.

#### 1.04 REFERENCES

- A American Joint Committee on Horticultural Nomenclature  
1. Standardized Plant Names, Second Edition, 1942, J. Horace McFarland Company.
- B American National Standards Institute/American Nursery & Landscape Association  
1. ANSI Z60.1 – American Standard for Nursery Stock.
- C ASTM International:  
1. ASTM D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

#### 1.05 SUBMITTALS

- A Certification: Submit certificates of inspection as required by governmental agencies. Submit manufacturer's certified analysis for soil amendments and fertilizers.
- B Planting Schedule: submit proposed planting schedule, indicating dates for each type of landscape work during normal seasons for such work in area of site. Correlate with specified maintenance periods to provide maintenance from date of substantial completion. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.
- C Maintenance Instruction: Submit typewritten instructions recommending procedures to be established by Owner for maintenance of landscape work for one full year. Submit prior to expiration of required maintenance period.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A All plants shall be packed, transported and handled with the care necessary to insure protection from injury. Plants shall be handled by their root zones only. They must not be dropped, thrown or otherwise roughly handled. All broken or damaged root balls, damaged containers or injured plants shall be rejected.
- B Plants in transport shall be fastened and secured in a manner that does not damage plant. Plants shall be protected from freezing, overheating, or excessive transpiration. All plants must be transported in a closed or tarp-covered vehicle or an open vehicle traveling less than 35 miles per hour. Anti-desiccant is permitted if used according to manufacturer's direction. The use of such a product does not constitute protection from heat, cold or wind.

- C Interim Storage: Plants not installed immediately upon their arrival at the site shall be stored in the proper manner as follows:
1. Balled and burlapped plants must be heeled in a trench which allows contact of roots to soil or mulch. Bare roots must be covered with a layer of mulch.
  2. All plants shall be protected from wind and excessive sun by the use of moist burlap or other such barrier. Roots shall never be exposed to freezing, excessive heat or harsh winds.
  3. Bare-root, balled and burlapped, and container plants shall be watered daily in hot weather and frequently during cold weather. Machine balled plants shall be kept moist but never waterlogged.

#### 1.07 PROJECT CONDITIONS

- A Proceed with complete landscape work as rapidly as portions of the site become available, working within seasonal limitations for each kind of landscape work required.
- B Utilities: Determine the locations of underground and overhead utilities and perform work in a manner to avoid possible damage. Repair to utilities, if damaged, shall be the responsibility of the Contractor at his expense.
- C Report of Unfavorable Conditions: The Contractor shall notify the Designer of adverse soil drainage conditions, discrepancies in sub-grade elevations, or other situations unfavorable for Landscape installation. He shall do no additional work, except at his own risk, in such an area until the problem has been reviewed by the Designer and resumption of work is authorized.
- D Report of Obstructions to Work: In the event that plants have been inadvertently located in the plan too close to a utility or other obstruction, the Contractor shall notify the Designer in order for relocations of plant material to be determined.
- E Protection of Site from Damage: The Contractor shall provide at his own expense, protection against trespassing and damage to seeded areas, planted areas and other construction areas until the Provisional Acceptance. He shall provide barricades, temporary fencing, signs, written warning or policing as may be required to protect such areas.
- F Protection and Replacement of Existing site Features: It shall be the Contractor's responsibility to locate and protect all existing above and below ground utilities. The Contractor shall be responsible for the protection of crowns, trunks and roots of existing trees, shrubs, lawns, paved areas, structures and other existing landscaped areas that are to remain.
1. Existing trees which may be subject to construction damage shall be boxed, fenced or otherwise protected before any work is started. Boxing or other protection will be removed at the end of construction. Do not locate heavy equipment or stockpiles within the drip-line of existing plants, or on lawns.
- G Water: Water shall be clean, clear water free from objectionable or harmful chemical qualities or organisms. Contractor shall verify location of water on the site and shall make arrangements and furnish equipment to convey water to planted areas.

#### 1.08 GUARANTEE AND MAINTENANCE

- A All plant material and other landscape work including lawns shall be guaranteed by the Contractor for a period of one year beginning on the date of Provisional Acceptance. Plant materials including trees, shrubs, grassed areas and perennials shall have acceptable appearance, be alive and healthy and exhibit vigorous normal growth. Upon notice by the Designer, the contractor shall replace, without cost to the Owner, and as soon as weather conditions permit, all unacceptable plants.
1. Replacements shall match adjacent specimens of the same species and shall conform to the standards for plant materials specified. All replaced material shall immediately be removed from the site and all necessary repairs to plants, grades, lawn areas, paving, and other areas damaged during replacement shall be made at no cost to the Owner.

2. When Work is provisionally accepted in parts, the guarantee period extends from each Provisional Acceptance date to the terminal date of the last Guarantee Period. Thus, all Guarantee Periods terminate at the same time.
  3. If the replacement is not acceptable during or at the end of the Guarantee Period, the Owner may elect either subsequent replacement or credit. Replacements shall have a similar one-year Guarantee from the date of replacement.
  4. Guarantee applies to losses other than those due to Acts of God, vandalism, or Owner neglect, as determined by the Owner.
- B Maintenance Period: Contractor shall provide all maintenance (including watering) for the landscape work (including grassing) during construction and for one year after Provisional Acceptance of the Work.

#### 1.09 INSPECTIONS

- A Interim Inspections: Inspections will be made during the progress of the work to check compliance with the plans and specifications during construction.
- B Punch List Inspection: When work has been substantially completed, contractor shall notify the Designer that work is ready for Punch List Inspection. The Designer, within reasonable time, will check work and prepare Punch List stating observed deficiencies of work which need correction prior to Provisional Acceptance Inspection. Punch List is for Contractor's convenience and shall not relieve him of any obligations of Contract. All items on the punch list shall have been attended to, prior to Provisional Acceptance Inspection(s).
- C Inspection for Provisional Acceptance of Work: Shall occur upon completion of final recommendations submitted by the Designer after the Punch List Inspection. Contractor shall notify the Designer 7 days in advance of anticipated date of the Provisional Acceptance Inspection. At this inspection all requirements on the Contract Documents must be satisfactorily completed. If work is unacceptable and additional inspection is required, Contractor shall reimburse Owner for additional expenses charged by the Designer for re-inspection and Owner shall deduct such amount from payment to Contractor
- D Inspection for Final Approval: To occur at end of Guarantee Period. At the end of the Guarantee period, the Designer will make a final inspection. Upon completion of all repairs or renewals which may appear at that time to be necessary, the Designer shall certify in writing to the Owner the Final Acceptance of the project.

#### PART 2 PRODUCTS

##### 2.01 SOIL

- A Topsoil: Shall be natural, fertile, agricultural soil, capable of sustaining vigorous plant growth. It shall be of uniform friable clay loam composition throughout, without admixture of subsoil. Soil shall be free of stones, lumps, live plants and their roots, sticks and other extraneous matter. The soil shall not be contaminated with substances harmful to the growth of plants and humans. It shall have a pH range of 5.0 to 7.0, and contain not less than five percent (5%) organic matter. The topsoil shall be free of noxious weeds, grasses or other foreign vegetation which would cause maintenance problems for the Owner after the contract is complete. Contractor shall assume full responsibility for control of noxious species introduced by the addition of soil infested with such species for a period of one year from Provisional Acceptance of the Work.
- B Backfill soil: Shall consist of topsoil mixed with amendments as specified in the detail drawings.
- C Any stored topsoil remaining after all work is in place shall be disposed of by the Contractor.

##### 2.02 SOIL AMENDMENTS

- A Lime: Natural limestone containing not less than eight five percent (85%) of total carbonates, ground so that not less than ninety percent (90%) passes a 10-mesh sieve and not less than fifty percent (50%) passes

a 100-mesh sieve. Provide lime in the form of dolomitic limestone meeting the specified requirements. Do not apply lime in areas where acid-loving plants are installed.

- B Organic Amendments: Shall consist of finely milled black Michigan Peat or other organic compost approved by the Designer. See graphic details for application rate and method.
- C Superphosphate: Soluble mixture of treated minerals, 20 percent available phosphoric acid.
- D Sand: Clean, washed sand, free of toxic materials. Manufactured limestone sand is not acceptable. See graphic details for application rate and method.
- E Commercial Fertilizer: complete fertilizer of neutral character, with some elements derived from organic sources and containing following percentages of available plant nutrients:
  - 1. For trees and shrubs, provide fertilizer with not less than 10% total nitrogen, 10% available phosphoric acid and 10 percent soluble potash and including trace elements. The use of a slow release product is recommended. Apply per manufacturer's recommendations.

## 2.03 MULCHES

- A Mulch shall be shredded hardwood bark unless otherwise specified on the materials list. Mulches shall be free from matured seed, noxious weeds, egg cases, harmful insects, or any species or chemical detrimental to the development of plants and humans. Contractor shall assume full responsibility for control of noxious weeds introduced on the site in the mulch for a period of one year after Provisional Acceptance of the Work. Mulches shall exhibit uniform texture, color and particle size. Submit sample for approval prior to placing mulch.

## 2.04 MATERIALS FOR PLANT SUPPORT AND PROTECTION

- A Plants to be staked and acceptable methods of staking are described herein. Tree stakes and guy stakes shall be pressure treated pine with minimum uniform cross-section of 2 x 2 inches nominal dimension, capable of withstanding above ground and underground conditions until Final Acceptance. Metal tree anchors manufactured specifically for this purpose may be used.
- B Lumber lengths shall be as specified herein. Guy wires shall be of 12 gauge or comparable strength, malleable, galvanized annealed wire.
- C Wires shall not come in contact with plant, but shall be covered with rubber hosing at point of contact. Hosing shall be two-ply, 1/2 inch minimum diameter reinforced rubber hose or approved comparable, non-injurious product of a length sufficient to properly protect trunk.
- D Commercial tree wrapping product shall be of bituminous impregnated tape, heavy crepe paper, or other approved material 4 to 12 inches wide. Twine shall be not less than 2-ply jute twine or comparable non-metallic material of neat, inconspicuous appearance. Contractor shall submit samples of above materials for approval to Designer.
- E Weed Barrier Fabric: Provide black polypropylene sheet 28 mils thick, grab tensile strength per ASTM D4632; 179LB (machine direction) 108 lbs (cross machine direction)

## 2.05 PLANT MATERIALS

- A Plant List: A complete list of plants, including a schedule of quantities, sizes and other requirements, is shown on the drawings.
- B Quality: Plants shall have a habit of growth that is normal for the species and shall be sound, healthy and free from disease, insect pests, mechanical injuries, defects, disfiguring knots, abrasions of the bark, and sunscald injuries. Plants shall stand straight and plumb in their natural position and shall be heavily and well branched in the manner of any high quality specimen of its species. During the appropriate season, plants shall exhibit healthy and full foliage. All plants shall be nursery grown from stock that has proven

- hardy to the location of this project. Plants shall have been growing under similar climactic conditions as the location of this project.
- C Nomenclature: The names of plants required shall conform generally with names accepted in nursery trade, but authority in case of dispute shall be Standardized Plant Names, Second Edition, American Joint Committee on Horticultural Nomenclature, 1942, J. Horace McFarland Company, Harrisburg, Pennsylvania.
- D Measurement: Plant size, grading standards and methods of measurement shall conform to those of the American Standard For Nursery Stock, American Nursery & Landscape Association, unless otherwise specified. All plants shall be an approximate average between the minimum and maximum dimensions cited on the plant list including: stem height, caliper, average spread of foliage, root spread and minimum number of stems. A plant shall be measured before pruning as it stands in its natural position. Height and spread specified refer to the main body of the plant and not the distance from tip to tip of branches or roots.
- E Sod: Provide strongly rooted sod not less than 2 years old, free of weeds and undesirable native grasses and machine cut to pad thickness of  $\frac{3}{4}$  inch (+/-  $\frac{1}{4}$  inch), excluding top growth and thatch. Provide only sod capable of vigorous growth and development when planted (viable, not dormant).
- F Provide sod of uniform pad sizes with maximum 5 percent deviation in either length or width. Broken pads or pads with uneven ends will not be acceptable. Sod pads incapable of supporting their own weight when suspended vertically with a firm grasp on upper 10 percent of pad will be rejected.
1. Provide sod as shown on the drawings.
  2. Turfgrass Species: Sod of grass species as specified, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed.

### PART 3 EXECUTION

#### 3.01 GENERAL PREPARATION

- A Before commencing any work, Landscape Contractor to ascertain the location of all utilities, subsurface drainage and underground construction so proper precautions may be taken not to disturb or damage any subsurface improvements. This Contractor will be held responsible for making, at his own expense, all repairs to damaged utilities resulting from the work hereunder.

#### 3.02 FINISH GRADING

- A All areas where existing grass lawn cover is damaged or disturbed by construction operations areas indicated on the site plan to be grass shall be surfaced with topsoil not less than 5" thick after compacting
- B If the previously stockpiled topsoil is not sufficient to cover the areas as specified, the Contractor shall furnish additional topsoil obtained from other sources. Topsoil obtained from other sources shall be clean, friable loam free from objectionable weed seeds.
- C Finished grades shall slope away from the building in all cases and shall contain no sinks or dams. Hand trim and rake topsoil to finished grades and leave ready for seeding or planting.
- D Minimum permitted slope on site shall be 1.5 percent to insure positive drainage.

#### 3.03 PREPARATION FOR PLANTING

- A Layout and Staking: Layout individual tree and shrub locations and areas for mass plantings. Stake locations and outline areas and secure Designer's acceptance before start of planting work. Make minor adjustments as may be requested. Contractor shall immediately notify Designer if structural changes in paving or other site construction are different from the plans and would cause a change in the location of any plants.

- B Planting Pit and Bed Preparation: No plant pits shall be dug or prepared until their location is approved by the Designer. Holes for shrubs and trees shall be dug as shown on the planting details.
1. Topsoil for backfilling shall be kept separate from excavated subsoil. Excess subsoil from planting areas shall be kept separate from excavated subsoil. Excess subsoil from planting areas shall be removed from the site unless otherwise directed.
  2. All existing sod remaining in areas shown to be planted, shall be sprayed, stripped and removed from the site. Following manufacturer's recommendations, especially with regard to temperature, rainfall, etc. Spray sod with Round-up or comparable systemic herbicide at least seven days prior to beginning work. If Bermuda grass is present, make at least two such applications in appropriate season prior to stripping sod. Upon beginning work, strip all sod to a depth of at least 2" and remove sod from site unless otherwise directed by the Owner.
  3. Shrub masses may be planted in beds rather than individual holes. Beds shall be evenly tilled to a depth of six inches. Organic matter, fertilizers and herbicides shall be evenly incorporated into those six inches. The soil shall then be raked smooth to an even grade allowing for adequate surface drainage prior to being covered with mulch as indicated on the details. Install weed barrier fabric over soil prior to planting shrubs. Make an "X" cut in the fabric at each plant location and fold back the tabs to allow the shrub to be planted. After planting and before mulch is spread, fold tabs of cut back into place.
  4. All plant beds shall be treated with Ronstar-G or comparable pre-emergent herbicide on the bare soil prior to placing mulch and on top of the mulch after it is in place. Apply per manufacturer's instructions.
- C Root and Ball Preparation: All plant material root balls shall receive the following treatment:
1. Prior to planting, container grown material shall have containers removed. If root bound, container plants shall have their exterior root mass sliced vertically three times or appropriately loosened in an acceptable manner.
  2. Any non-decomposable twine or containers shall be removed from any plant prior to backfilling. Non-decomposable burlap must be either removed from the root ball after placement in the hole or rolled under the root ball as far as possible from the surface. Any damaged roots shall be pruned back according to acceptable horticultural practices.
  3. The Contractor shall be responsible for the removal and control of any weeds growing in the soil or any container grown or balled and burlapped plants which are used on this project.

### 3.04 SETTING PLANTS

- A Backfill in bottom of pit shall be lightly tamped or settled by watering prior to setting plants. Each plant shall be placed in the center of the planting hole in a vertically plumb position. Plants shall be rotated to obtain the best visual appearance and proper relationship to nearby buildings or adjacent plants. Sufficient backfill should be placed in the bottom of the hole so that the plant sits at the same grade or no more than two inches above the grade that it rested in the field. The roots of bare root plants, pruned appropriately, shall be spread out to their approximate natural position over a cone or mound of soil formed in the center of the planting pit. Balled and burlapped plants shall be set straight in the hole while still in their wrapped ball.
- B Backfilling and Backfill Content: Backfill shall consist of topsoil plus peat moss at a ratio of 3:1, respectively. The plant pit shall be backfilled in layers around the roots or ball. Each layer shall be carefully worked around loose roots and lightly settled in place in such a manner as to avoid injury to the roots or ball and to avoid disturbing the position of the plant. When approximately two-thirds of the plant hole has been backfilled: 1) the balled and burlapped plants shall have the top third of the burlap cut away or folded back, 2) All plant pits shall be filled with water and allowed to settle. After water has settled, backfill with specified topsoil mixture and tamp lightly to grade.
- C Watering: Immediately after planting, the entire planting pit area and root mass shall be soaked with contaminant free water again and any erosion caused by watering repaired. All plants shall be watered by the Contractor as required during the maintenance period.

- D Mulching: After the water has been absorbed and any settlement has been brought to grade, a 2-3 inch layer of mulch shall be spread around the base of the plant. As pictured on the planting details, construct a 4 inch saucer of mulch around the plant pit.
- E Pruning: The bruised or broken parts of large or fleshy roots be cut off smooth before planting. The tops of deciduous plants shall be pruned wither immediately before or after planting. This shall consist of removing 1/4 to 1/3 of the top or thinning out and/or heading back the stems and top branches, and shall be done so that the plant retains its natural form. All pruning shall be done in accordance with standard horticultural practices. Only the proper sharp, clean tools shall be used. The top leader of any tree shall never be pruned unless previously approved by the Designer. All cuts shall be made close to the trunk or branch except when heading back. When heading back, cuts shall be made just above a viable bud. Evergreen plants shall not be pruned except to remove dead or broken branches unless otherwise indicated in the drawings. All cut surfaces one inch or more in diameter shall be painted with a standard non-toxic tree wound dressing.
- F Staking: All trees over 6' in height and up to 2 inches caliper shall be staked in the following manner:
1. Use 2 parallel stakes driven 18 inches into firm soil about 1 foot beyond planting hole. The height of the stakes shall be two-thirds that of the tree after being driven into the ground.
  2. The tree is then supported by wires attached to both stakes and looped around trees. Rubber hosing should be used to protect trees.
- G Guying: All trees over 2 inches caliper shall be guyed in the following manner:
1. Stakes are driven into the ground 18 inches – 30 inches at a 45 degree angle away from the tree trunk and notched to hold the wire secure. The distance from the tree trunk to the stake is approximately the same as the height of the tree.
  2. The wire is then fastened two-thirds of the way up the trunk by a loose rubber-hose-covered loop. The other end is fastened to the stake.
  3. Tighten wire by twisting wire with a small stick or install turnbuckles if necessary.
- H Bed Preparation (Annuals and Groundcovers): The soil for planting beds shall consist of a minimum of 4 inches of topsoil and peat moss in the ratio of 3:1, respectively. Beds shall be evenly tilled, raked to a level grade, and then mulched prior to planting.
1. Plant Preparation: Plants shall be thoroughly soaked with water before planting. Care should be taken to handle plants by their roots. All containerized plants shall have their containers removed and their soil/root mass loosened.
  2. Setting Plants: Place plants at even spacing according to the plantings details. Bulbs, tubers, or other below ground root structures shall be placed at a proper depth according to standard horticultural practices.
  3. Watering: Immediately after planting, plants shall be thoroughly watered with a diffusing type applicator such as a sprinkler. Water shall be uncontaminated. Contractor shall be responsible for watering until the end of the maintenance period.

### 3.05 SODDING

- A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.
- B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
1. Lay sod across angle of slopes exceeding 1:3.
  2. Anchor sod on slopes exceeding 1:6 with wood pegs or steel staples spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.
  3. Saturate sod with fine water spray within two hours of planting. During first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below sod.

3.06 MAINTENANCE

- A Remove weeds and mulch all existing landscaping to remain.
- B Begin maintenance immediately after planting.
- C Maintain trees, shrubs, and other plants until after final acceptance but in no case less than the following period: 60 days after substantial completion of planting.
- D Maintain trees, shrubs, and other plants by pruning, cultivating and weeding as required for healthy growth. Restore planting saucers. Tighten and repair stake and or vertical position as required. Restore or replace damaged wrappings. Spray as required to keep trees and shrubs free of insects and disease.

3.07 CLEAN UP

- A Clean Up and Restoration of Damaged Areas: During planting, excess and waste materials shall be continuously and promptly removed, lawn areas and paved surfaces kept clear and all reasonable precautions shall be taken to avoid damage to existing structures, plants and grass. Prior to Acceptance of Work, all damaged areas must be restored with the same quality of work as required in these specifications. All debris, waste material, excess soil etc. shall be removed. Walks and paved areas shall be hosed down and scrubbed clean, and the entire site made neat. Contractor shall provide barricades, signage, etc. as is prudently necessary to prevent pedestrian or vehicular accidents which could occur as a result of the Contract work.

END OF SECTION



PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Water-distribution piping and specialties outside the building for the following:
    - a. Water services.
    - b. Combined water service and fire-service mains.
    - c. Utility-furnished products include water meters that will be furnished to the site, ready for installation.

1.02 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections.

1.03 DEFINITIONS

- A. Combined Water Service and Fire-Service Main: Exterior water piping for both domestic-water and fire-suppression piping.
- B. Water Service: Exterior domestic-water piping.
- C. PVC: Polyvinyl chloride plastic.
- D. DIP: Ductile Iron Pipe.

1.04 REFERENCES

- A. ASME – American Society of Mechanical Engineers
1. ASME A112.1.2 - Air Gaps in Plumbing Systems (for Plumbing Fixtures and Water-Connected Receptors).
  2. ASME A112.6.3 – Floor Drains.
  3. ASME B1.20.1 – Pipe Threads, General Purpose, Inch.
  4. ASME B16.5 - Flange and Flanged Fittings Specification.
  5. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.
  6. ASME B16.24 - Cast Copper Alloy Pipe Flanges, Flanged Fittings, and Valves: Classes 150, 300, 600, 900, 1500, and 2500.
- B. ASSE – American Society of Sanitary Engineering:
1. ASSE 1079 - Performance Requirements for Dielectric Pipe Unions.
- C. ASTM International:
1. ASTM A36 - Standard Specification for Carbon Structural Steel.
  2. ASTM A48 - Standard Specification for Gray Iron Castings.
  3. ASTM A674 - Standard Practice for Polyethylene Encasement for Ductile Iron Pipe.
  4. ASTM B32 - Standard Specification for Solder Metal.
  5. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
  6. ASTM B813 - Standard Specification for Water Flushable Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube.
  7. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.
  8. ASTM C858 - Standard Specification for Underground Precast Concrete Utility Structures.
  9. ASTM C891 - Standard Practice for Installation of Underground Precast Concrete Utility Structures.
  10. ASTM D1785 – Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

11. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
  12. ASTM D2774 – Standard Practice for Underground Installation of Thermoplastic Pressure Piping.
  13. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
  14. ASTM F645 – Standard Guide for Selection, Design, and Installation of Thermoplastic Water-Pressure Piping Systems.
  15. ASTM F1545 - Standard Specification for Plastic-Lined Ferrous Metal Pipe, Fittings, and Flanges.
- D. AWWA – American Water Works Association:
1. AWWA C105 – Polyethylene Encasement For Ductile-Iron Pipe Systems.
  2. AWWA C110 - American National Standard for Ductile-Iron and Gray-Iron Fittings for Water.
  3. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
  4. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.
  5. AWWA C153 - Ductile-Iron Compact Fittings.
  6. AWWA C219 - Bolted Sleeve-Type Couplings for Plain-End Pipe.
  7. AWWA C502 - Dry-Barrel Fire Hydrants.
  8. AWWA C509 – Resilient-Seated Gate Valves for Water Supply Service.
  9. AWWA C511 - Reduced-Pressure Principle Backflow Prevention Assembly.
  10. AWWA C550 - Protective Interior Coatings for Valves and Hydrants.
  11. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances.
  12. AWWA C651 - Disinfecting Water Mains.
  13. AWWA C700 - Cold-Water Meters—Displacement Type, Metal Alloy Main Case.
  14. AWWA C800 - Underground Service Line Valves and Fittings.
  15. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 60 In. (100 mm Through 1,500 mm).
  16. AWWA M17 - Fire Hydrants: Installation, Field, Testing, and Maintenance.
  17. AWWA M23 - PVC Pipe—Design and Installation.
  18. AWWA M41 - Ductile-Iron Pipe and Fittings.
  19. AWWA M44 - Distribution Valves: Selection, Installation, Field Testing, And Maintenance, Second Edition.
- E. IAPMO – International Association of Plumbing and Mechanical Officials:
1. IAPMO PS 66 – Dielectric Fittings.
- F. MSS – Manufacturers Standardization Society:
1. MSS SP 60 - Connecting Flange Joints between Tapping Sleeves and Tapping Valves.
  2. MSS SP 123 - Non-Ferrous Threaded and Solder-Joint Unions for Use with Copper Water Tube.
- G. NFPA – National Fire Protection Association:
1. NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
  2. NFPA 70 – National Electrical Code.
  3. NFPA 1960 - Standard for Fire Hose Connections, Spray Nozzles, Manufacturer's Design of Fire Department Ground Ladders, Fire Hose, and Powered Rescue Tools.
- H. NSF International:
1. NSF 14 - Certification of Plastic Piping Products.
  2. NSF 61 - Drinking Water System Components.
- I. UL – Underwriters Laboratories:
1. UL 194 - Standard for Gasketed Joints for Ductile-Iron Pipe and Fittings for Fire Protection Service.
  2. UL 486A486B - Wire Connectors.
  3. UL 753 - Alarm Accessories for Automatic Water-Supply Control Valves for Fire Protection Service.
  4. UL 1285 - Pipe and Couplings, Polyvinyl Chloride (PVC), and Oriented Polyvinyl Chloride (PVCO) for Underground Fire Service.

1.05 SUBMITTALS

- A. Product Data: For the following:
  - 1. Piping materials and fittings.
  - 2. Piping specialties.
  - 3. Valves and accessories.
  - 4. Water meters and accessories.
  - 5. Backflow preventers and assemblies.
  - 6. Protective enclosures.
  - 7. Fire hydrants.
  - 8. Flushing hydrants.
  - 9. Post hydrants.
- B. Shop drawings for precast concrete vaults, including frames and covers, ladders, and drains.
- C. Shop drawings for power, signal, and control wiring diagrams.
- D. Coordination Drawings: For piping and specialties including relation to other services in same area. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.
- E. Field Quality-Control Test Reports.
- F. Operation and Maintenance Data: For specialties to include in emergency, operation, and maintenance manuals. In addition to submittal items specified in Section 01 30 00 – Administrative Requirements include the following:
  - 1. Water meters.
  - 2. Valves.
  - 3. Backflow preventers.
  - 4. Protective enclosures.
  - 5. Fire hydrants.
  - 6. Flushing hydrants.
  - 7. Post hydrants.

1.06 QUALITY ASSURANCE

- A. Product Options: Drawings indicate sizes, profiles, and dimensional requirements of piping and specialties and are based on specific system indicated.
- B. Regulatory Requirements:
  - 1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
  - 2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
  - 3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.
- C. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- D. 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.
- E. Comply with ASTM F645 for selection, design, and installation of thermoplastic water piping.
- F. Comply with FM's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
- G. Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression. Comply with NSF 14 for plastic potable-water-service piping.

Include marking "NSF-pw" on piping. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
  - 1. Ensure that valves are dry and internally protected against rust and corrosion.
  - 2. Protect valves against damage to threaded ends and flange faces.
  - 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves, including fire hydrants, according to the following:
  - 1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
  - 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
- D. Deliver piping 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.
- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.08 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
  - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without Architect's written permission.

1.09 COORDINATION

- A. Coordinate connection to water main with utility company.

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 Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
  - 2. Products: Subject to compliance with requirements, provide one of the products specified.
  - 3. 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.
  - 4. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.02 DUCTILE-IRON PIPE AND FITTINGS

- A. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint, bell- and plain-spigot end unless grooved or flanged ends are indicated.
- B. Push-on-Joint, Ductile-Iron Fittings: AWWA C153, ductile-iron compact pattern.
- C. Gaskets: AWWA C111, rubber.
- D. Ductile-Iron Expansion Joints: Three-piece, ductile-iron assembly consisting of telescoping sleeve with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Select and assemble components for expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

2.03 COPPER TUBE AND FITTINGS

- A. Soft Copper Tube: ASTM B 88, Type K (ASTM B 88M, Type A), water tube, annealed temper.
- B. Copper Fittings: ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings.
- C. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
- D. 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 PVC PIPE AND FITTINGS

- A. PVC, Schedule 40 Pipe: ASTM D 1785. Socket Fittings: ASTM D 2466.
- B. PVC, AWWA Pipe: AWWA C900, Class 200, with bell end with gasket, and with spigot end.
  - 1. Comply with UL 1285 for fire-service mains if indicated.
  - 2. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
  - 3. Gaskets: AWWA C111, rubber.
  - 4. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

2.05 JOINING MATERIALS

- A. Refer to Division 33 for commonly used joining materials.
- B. Transition Couplings:
  - 1. Underground Piping, NPS 1-1/2 (DN 40) and Smaller: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
  - 2. Underground Piping, NPS 2 (DN 50) and Larger: AWWA C219, metal, sleeve-type coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
  - 3. Aboveground or Vault Piping: Pipe fitting same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
- C. Brazing Filler Metals: AWS A5.8, BCuP Series.
- D. Soldering Flux: ASTM B813, water-flushable type.
- E. Solder Filler Metal: ASTM B32, lead-free type with 0.20 percent maximum lead content.

- F. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

## 2.06 JOINING MATERIALS

- A. Refer to Division 2 Section "Utility Materials" for commonly used joining materials.
- B. Transition Couplings:
1. Underground Piping, NPS 1-1/2 (DN 40) and Smaller: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
  2. Underground Piping, NPS 2 (DN 50) and Larger: AWWA C219, metal, sleeve-type coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
  3. Aboveground or Vault Piping: Pipe fitting same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
- C. Brazing Filler Metals: AWS A5.8, BCuP Series.
- D. Soldering Flux: ASTM B813, water-flushable type.
- E. Solder Filler Metal: ASTM B32, lead-free type with 0.20 percent maximum lead content.
- F. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

## 2.07 PIPING SPECIALTIES

- A. Flexible Connectors:
1. Nonferrous-Metal Piping: Bronze hose covered with bronze wire braid; with copper-tube, pressure-type, solder-joint ends or bronze flanged ends brazed to hose.
  2. Ferrous Piping: Stainless-steel hose covered with stainless-steel wire braid; with ASME B1.20.1, threaded steel pipe nipples or ASME B16.5, steel pipe flanges welded to hose.
- B. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
- C. Tubular-Sleeve Pipe Couplings:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Cascade Waterworks Manufacturing.
    - b. Dresser, Inc.; Dresser Piping Specialties.
    - c. Ford Meter Box Company, Inc. (The); Pipe Products Div.
    - d. Hays Fluid Controls; a division of ROMAC Industries Inc.
    - e. JCM Industries.
    - f. Smith-Blair, Inc.
    - g. Viking Johnson.
  2. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners and with ends of same sizes as piping to be joined.
    - a. Standard: AWWA C219.
    - b. Center-Sleeve Material: Manufacturer's standard.
    - c. Gasket Material: Natural or synthetic rubber.
    - d. Pressure Rating: 200 psig (1380 kPa) minimum.
    - e. Metal Component Finish: Corrosion-resistant coating or material.
- D. Split-Sleeve Pipe Couplings:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Victaulic Depend-O-Lok.

2. Description: Metal, bolted, split-sleeve-type, reducing or transition coupling with sealing pad and closure plates, O-ring gaskets, and bolt fasteners.
  - a. Standard: AWWA C219.
  - b. Sleeve Material: Manufacturer's standard.
  - c. Sleeve Dimensions: Of thickness and width required to provide pressure rating.
  - d. Gasket Material: O-rings made of EPDM rubber, unless otherwise indicated.
  - e. Pressure Rating: 200 psig (1380 kPa) minimum.
  - f. Metal Component Finish: Corrosion-resistant coating or material.
- E. Dielectric Fittings:
  1. Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
  2. Dielectric Unions:
    - a. Standard: ASSE 1079.
    - b. Pressure Rating: 250 psig (1725 kPa).
    - c. End Connections: Solder-joint copper alloy and threaded ferrous.
  3. Dielectric Flanges:
    - a. Standard: ASSE 1079.
    - b. Factory-fabricated, bolted, companion-flange assembly.
    - c. Pressure Rating: 300 psig (2070 kPa).
    - d. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
  4. Dielectric-Flange Insulating Kits:
    - a. Nonconducting materials for field assembly of companion flanges.
    - b. Pressure Rating: 150 psig (1035 kPa).
    - c. Gasket: Neoprene or phenolic.
    - d. Bolt Sleeves: Phenolic or polyethylene.
    - e. Washers: Phenolic with steel backing washers.
  5. Dielectric Nipples:
    - a. Standard: IAPMO PS 66
    - b. Electroplated steel nipple. complying with ASTM F1545.
    - c. Pressure Rating: 300 psig (2070 kPa) at 225 deg F (107 deg C).
    - d. End Connections: Male threaded or grooved.
    - e. Lining: Inert and noncorrosive, propylene.

## 2.08 CORROSION-PROTECTION ENCASUREMENT FOR PIPING

- A. Encasement for Underground Metal Piping: ASTM A674 or AWWA C105, PE film, 0.008-inch (0.20-mm) minimum thickness, tube or sheet.

## 2.09 CAST IRON GATE VALVES

- A. Available Manufacturers:
  1. American AVK Co.; Valves & Fittings Div.
  2. American Cast Iron Pipe Co.; American Flow Control Div.
  3. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
  4. Crane Co.; Crane Valve Group; Stockham Div.
  5. East Jordan Iron Works, Inc.
  6. Grinnell Corporation; Mueller Co.; Water Products Div.
  7. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
  8. McWane, Inc.; Kennedy Valve Div.
  9. McWane, Inc.; Tyler Pipe; Utilities Div.
  10. NIBCO INC.
  11. United States Pipe and Foundry Company.
- B. Nonrising-Stem, Resilient-Seated Gate Valves: AWWA C509, gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.

1. Minimum Working Pressure: 200 psig (1380 kPa).
  2. End Connections: Mechanical joint.
  3. Interior Coating: Complying with AWWA C550.
- C. OS&Y, Rising-Stem, Resilient-Seated Gate Valves: Cast- or ductile-iron body and bonnet, with bronze or gray- or ductile-iron gate, resilient seats, and bronze stem.
1. Standard: AWWA C509.
  2. Minimum Pressure Rating: 200 psig (1380 kPa).
  3. End Connections: Flanged.
- 2.10 GATE VALVE ACCESSORIES AND SPECIALTIES
- A. Tapping-Sleeve Assemblies: Comply with MSS SP-60. Include sleeve and valve compatible with drilling machine.
1. Available Manufacturers:
    - a. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
    - b. East Jordan Iron Works, Inc.
    - c. Grinnell Corporation; Mueller Co.; Water Products Div.
    - d. International Piping Services Company.
    - e. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
    - f. McWane, Inc.; Kennedy Valve Div.
    - g. McWane, Inc.; M & H Valve Company Div.
    - h. United States Pipe and Foundry Company.
  2. Tapping Sleeve: Ductile-iron two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
  3. Valve: AWWA, cast-iron, nonrising-stem, resilient-seated gate valve with one raised face flange mating tapping-sleeve flange.
- B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," bottom section with base of size to fit over valve, and approximately 5-inch- (125-mm-) diameter barrel.
1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.
- 2.11 CORPORATION VALVES AND CURB VALVES
- A. Available Manufacturers:
1. Amcast Industrial Corporation; Lee Brass Co.
  2. Ford Meter Box Company, Inc. (The).
  3. Grinnell Corporation; Mueller Co.; Water Products Div.
  4. Jones, James Company.
  5. Master Meter, Inc.
  6. McDonald, A. Y. Mfg. Co.
  7. Red Hed Manufacturing Co.
- B. Service-Saddle Assemblies: Comply with AWWA C800. Include saddle and valve compatible with tapping machine.
1. Service Saddle: Copper alloy with seal and AWWA C800, threaded outlet for corporation valve.
  2. Corporation Valve: Bronze body and ground-key plug, with AWWA C800, threaded inlet and outlet matching service piping material.
  3. Manifold: Copper fitting with two to four inlets as required, with ends matching corporation valves and outlet matching service piping material.
- 2.12 WATER METERS
- A. Water meters will be furnished by utility company.

- B. Description: AWWA C700, displacement-type, bronze main case. Register flow in gallons unless cubic feet are indicated.

2.13 WATER-METER BOXES

- A. Description: Cast-iron body and cover for disc-type water meter with lettering "WATER METER" in cover; and slotted, open-bottom base section of length to fit over service piping.  
1. Option: Base section may be cast-iron, PVC, clay, or other pipe.
- B. Description: For traffic areas - Polymer-concrete body and cover for disc-type water meter with lettering "WATER" in cover; and slotted, open-bottom base section of length to fit over service piping. Include vertical and lateral design loadings of 15,000 lb. minimum over 10 by 10 inches (6800 kg minimum over 254 by 254 mm) square.

2.14 BACKFLOW PREVENTERS

- A. Reduced-Pressure-Principle Backflow Preventers:
1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
    - a. Ames Fire & Waterworks; a division of Watts Regulator Co.
    - b. Conbraco Industries, Inc.
    - c. FEBCO; SPX Valves & Controls.
    - d. Flomatic Corporation.
    - e. Watts Water Technologies, Inc.
    - f. Wilkins; a Zurn company.
  2. Standard: AWWA C511.
  3. Operation: Continuous-pressure applications.
  4. Pressure Loss: 12 psig (83 kPa) maximum, through middle 1/3 of flow range.
  5. Size: Per utility plan.
  6. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved stainless steel for NPS 2-1/2 (DN 65) and larger.
  7. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.
  8. Configuration: Designed for vertical inlet, horizontal center section, and vertical outlet flow.
  9. Accessories: Ball type with threaded ends on inlet and outlet of NPS 2 (DN 50) and smaller; OS&Y gate type with flanged ends on inlet and outlet of NPS 2-1/2 (DN 65) and larger. Air-Gap Fitting: ASME A112.1.2, matching backflow preventer connection.
- B. Double-Check, Backflow-Prevention Assemblies:
1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
    - a. Ames Fire & Waterworks; a division of Watts Regulator Co.
    - b. Conbraco Industries, Inc.
    - c. FEBCO; SPX Valves & Controls.
    - d. Flomatic Corporation.
    - e. Watts Water Technologies, Inc.
    - f. Wilkins; a Zurn company.
  2. Standard: AWWA C510.
  3. Operation: Continuous-pressure applications, unless otherwise indicated.
  4. Pressure Loss: 5 psig (35 kPa) maximum, through middle 1/3 of flow range.
  5. Size: Per utility plan.
  6. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved stainless steel for NPS 2-1/2 (DN 65) and larger.
  7. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.
  8. Configuration: Designed for horizontal, straight through flow.

9. Accessories: Ball valves with threaded ends on inlet and outlet of NPS 2 (DN 50) and smaller; OS&Y gate valves with flanged ends on inlet and outlet of NPS 2-1/2 (DN 65) and larger.
10. Backflow Preventer Test Kits: Factory calibrated, with gages, fittings, hoses, and carrying case with test-procedure instructions. Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. Conbraco Industries, Inc.
  - b. FEBCO; SPX Valves & Controls.
  - c. Flomatic Corporation.
  - d. Watts Water Technologies, Inc.
  - e. Wilkins; a Zurn company.

#### 2.15 CONCRETE VAULTS

- A. Description: Precast, reinforced-concrete vault, designed for A-16 load designation according to ASTM C 857 and made according to ASTM C 858.
- B. Ladder: ASTM A36/A36M, steel or polyethylene-encased steel steps.
- C. Manhole: ASTM A48, Class No.35 (ASTM A48M, Class No.250) minimum tensile strength, gray-iron traffic frame and cover, 24-inch (610-mm) diameter or greater, unless otherwise indicated.
- D. Drain: ASME A112.6.3, cast-iron floor drain with outlet of size indicated. Include body anchor flange, light-duty cast-iron grate, bottom outlet, and integral or field-installed clapper-type backwater valve.

#### 2.16 PROTECTIVE ENCLOSURES

- A. Available Manufacturers:
  1. G&C Enclosures, Inc.
  2. Hot Box, Inc.
  3. HydroCowl, Inc.
  4. Watts Industries, Inc.; Water Products Div.
- B. Freeze-Protection Enclosures: Insulated and with heat source to maintain minimum internal temperature of 40° F (4° C) when external temperatures reach as low as -34° F (-36° C).
  1. Class I: For equipment or devices other than pressure or atmospheric vacuum breakers.
  2. Class I-V: For pressure or atmospheric vacuum breaker equipment or devices. Include drain opening in housing.
    - a. Housing: Reinforced -fiberglass construction.
      - i. Drain opening for units with drain connection.
      - ii. Access doors with locking devices.
      - iii. Insulation inside housing.
      - iv. Anchoring devices for attaching housing to concrete base.
  3. Electric heating cable or heater with self-limiting temperature control.
- C. Precast concrete base of dimensions required to extend at least 6 inches (150 mm) beyond edges of enclosure housings. Include openings for piping.

#### 2.17 FREESTANDING FIRE HYDRANTS

- A. Dry-Barrel, High-Pressure Fire Hydrants: AWWA C502, one NPS 4-1/2 (DN 115) and two NPS 2-1/2 (DN 65) outlets, 5-1/4 inch (133 mm) main valve, drain valve, and NPS 6 (DN 150) mechanical-joint inlet. Include interior coating according to AWWA C550. Hydrant shall have cast-iron body, compression-type valve opening against pressure and closing with pressure, and 250-psig (1725-kPa) minimum working-pressure design.
  1. Available Manufacturers:
    - a. American AVK Co.; Valves & Fittings Div.
    - b. American Cast Iron Pipe Co.; American Flow Control Div.

- c. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
  - d. American Foundry Group, Inc.
  - e. East Jordan Iron Works, Inc.
  - f. Grinnell Corporation; Mueller Co.; Water Products Div.
  - g. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
  - h. McWane, Inc.; Kennedy Valve Div.
  - i. McWane, Inc.; M & H Valve Company Div.
  - j. Troy Valve.
  - k. United States Pipe and Foundry Company.
- 2. Outlet Threads: NFPA 1960, with external hose thread used by local fire department. Include cast-iron caps with steel chains.
  - 3. Operating and Cap Nuts: Pentagon, 1-1/2 inches (40 mm) point to flat.
  - 4. Operation: Open hydrant valve by turning operating nut to left or counterclockwise.
  - 5. Exterior Finish: Red alkyd-gloss enamel paint, unless otherwise indicated. Verify color requirements with jurisdiction having authority.

## 2.18 FIRE DEPARTMENT CONNECTIONS

### A. Fire Department Connections:

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. Elkhart Brass Mfg. Co., Inc.
  - b. Fire End & Croker Corporation.
  - c. Guardian Fire Equipment, Inc.
  - d. Kidde Fire Fighting.
  - e. Potter Roemer.
  - f. Reliable Automatic Sprinkler Co., Inc.
- 2. Description: Freestanding, with cast-bronze body, thread inlets according to NFPA 1960 and matching local fire department hose threads, and threaded bottom outlet. Include lugged caps, gaskets, and chains; lugged swivel connection and drop clapper for each hose-connection inlet; 18-inch- (460-mm-) high brass sleeve; and round escutcheon plate.
  - a. Standard: UL 405.
  - b. Connections: Two NPS 2-1/2 (DN 65) inlets and one NPS 4 (DN 100) outlet.
  - c. Inlet Alignment: Inline, horizontal.
  - d. Finish Including Sleeve: Polished bronze.
  - e. Escutcheon Plate Marking: "AUTO SPKR."

## 2.19 ALARM DEVICES

- A. Alarm Devices, General: UL 753 and FMG approved, of types and sizes to mate and match piping and equipment.
- B. Supervisory Switches: Single pole, double throw; designed to signal valve in other than fully open position.

## PART 3 EXECUTION

### 3.01 EARTHWORK

- A. Refer to Division 31 Section for excavating, trenching, and backfilling.

### 3.02 PIPING APPLICATIONS

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.

- B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used in applications below, unless otherwise indicated.
- C. Do not use flanges, unions, or keyed couplings for underground piping.
- D. Flanges, unions, keyed couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
- E. Underground Water-Service Piping NPS  $\frac{3}{4}$  to NPS 3. Use the following piping materials for each size range unless otherwise indicated on the drawings:
  - 1. Soft copper tube, ASTM B 88, Type K (ASTM B 88M, Type A); wrought-copper, solder-joint fittings; and brazed joints; or
  - 2. PVC, Schedule 40 pipe; PVC, Schedule 40 socket fittings; and solvent-cemented joints.
- F. Underground water-service piping NPS 4 to NPS 8. Use the following piping materials for each size range unless otherwise indicated on the drawings:
  - 1. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical joints; or
  - 2. PVC, AWWA C900, Class 200 pipe; mechanical-joint, ductile-iron fittings; and gasketed joints.
- G. Water Meter Box Water-Service Piping NPS  $\frac{3}{4}$  to NPS 3 shall be same as underground water-service piping.
- H. Underground Fire-Service-Main Piping NPS 4 to NPS 12. Use the following piping materials for each size range unless otherwise indicated on the drawings:
  - 1. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical joints; or
  - 2. PVC, AWWA C900, Class 200 pipe listed for fire-protection service; mechanical-joint, ductile-iron fittings; and gasketed joints.
- I. Underground Combined Water-Service and Fire-Service-Main Piping NPS 6 to NPS 12. Use the following piping materials for each size range unless otherwise indicated on the drawings:
  - 1. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical joints.
  - 2. PVC, AWWA C900, Class 200 pipe listed for fire-protection service; mechanical-joint, ductile-iron fittings; and gasketed joints.

### 3.03 VALVE APPLICATIONS

- A. General Application: Use mechanical-joint-end valves for NPS 3 (DN 80) and larger underground installation. Use flanged-end valves for installation in vaults. Use UL/FM, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 (DN 50) and smaller installation.
- B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
  - 1. Underground Valves, NPS 3 (DN 80) and Larger: AWWA, cast-iron, nonrising-stem, resilient seated gate valves with valve box.

### 3.04 JOINT CONSTRUCTION

- A. Make pipe joints according to the following:
  - 1. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
  - 2. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
  - 3. Copper Tubing Soldered Joints: ASTM B 828. Use flushable flux and lead-free solder.

4. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
5. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure. Refer to Division 2 Section "Utility Materials" for joining piping of dissimilar metals.

3.05 PIPING INSTALLATION

- A. Water-Main Connection: Arrange with utility company for tap of size and in location indicated in water main.
- B. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.
- C. Make connections larger than NPS 2 (DN 50) with tapping machine according to the following:
  1. Install tapping sleeve and tapping valve according to MSS SP-60.
  2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
  3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
  4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.
- D. Make connections NPS 2 (DN 50) and smaller with drilling machine according to the following:
  1. Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company standards.
  2. Install service-saddle assemblies on water-service pipe to be tapped. Position outlets for corporation valves.
  3. Use drilling machine compatible with service-saddle assemblies and corporation valves. Drill hole in main. Remove drilling machine and connect water-service piping.
  4. Install corporation valves into service-saddle assemblies.
  5. Install manifold for multiple taps in water main.
  6. Install curb valve in water-service piping with head pointing up and with service box.
- E. Comply with NFPA 24 for fire-service-main piping materials and installation.
  1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
- F. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
  1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
- G. Install copper tube and fittings according to CDA's "Copper Tube Handbook."
- H. Install PVC, AWWA pipe according to AWWA M23 and ASTM F 645.
- I. Unless otherwise indicated on drawings, bury piping with depth of cover over top at least 36 inches, with top at least 12 inches below level of maximum frost penetration, and according to the following:
  1. Under Driveways and Roads: With at least 36 inches cover over top.
  2. Under Railroad Tracks: With at least 48 inches cover over top.
  3. In Loose Gravelly Soil and Rock: With at least 12 inches additional cover.
  4. Under Roads: With at least 36 inches cover over top.
- J. Install piping by tunneling, jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
- K. Extend water-service piping and connect to water-supply source and building water piping systems at outside face of building wall in locations and pipe sizes indicated.

1. Terminate water-service piping at building wall until building water piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building water piping systems when those systems are installed.
- L. Sleeves and mechanical sleeve seals are specified elsewhere.
- M. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.
- N. Anchor service-entry piping to building wall.
- O. See Division 21 sections for fire-suppression water piping inside the building.
- P. See Division 22 sections for potable-water piping inside the building.
- Q. Install water-supply piping with shutoff valve in water supply to each and any post hydrant and drinking fountain indicated. Use curb valve and service box.
- R. Install trap below frost line on drain outlet of each and any drinking fountain indicated.
- 3.06 ANCHORAGE INSTALLATION
  - A. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
    1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
    2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
  - B. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.
- 3.07 VALVE INSTALLATION
  - A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
  - B. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.
- 3.08 WATER-METER INSTALLATION
  - A. Install water meters, piping, and specialties according to utility company's written requirements.
  - B. Water Meters: Install displacement-type water meters, NPS 2 (DN 50) and smaller, in meter boxes with shutoff valves on water-meter inlets. Include valves on water-meter outlets and valved bypass around meters unless prohibited by authorities having jurisdiction.
- 3.09 ROUGHING-IN FOR WATER METERS
  - A. Rough-in piping and specialties for water-meter installation according to utility company's written instructions and requirements.
- 3.10 BACKFLOW-PREVENTER INSTALLATION
  - A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.
  - B. Do not install backflow preventers with relief drain in vault or other space subject to flooding.
  - C. Do not install bypass piping around backflow preventers.

- D. Support NPS 2-1/2 (DN 65) and larger backflow preventers, valves, and piping near floor and on brick or concrete piers.
- 3.11 VAULT CONSTRUCTION /INSTALLATION
  - A. See Section 03 30 00 "Concrete Work" for concrete vaults.
  - B. Install precast concrete vaults according to ASTM C891.
  - C. Connect drain outlet to storm drainage piping. Refer to Section 33 41 00 for Storm Drainage.
- 3.12 PROTECTIVE ENCLOSURE INSTALLATION
  - A. Install concrete base level and with top approximately 2 inches (50 mm) above grade.
  - B. Install protective enclosure over valves and equipment.
  - C. Anchor protective enclosure to concrete base.
- 3.13 FIRE HYDRANT INSTALLATION
  - A. General: Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.
  - B. AWWA-Type Fire Hydrants: Comply with AWWA M17.
- 3.14 POST HYDRANT INSTALLATION
  - A. Install post hydrants in pavement or with concrete anchor.
- 3.15 FIRE DEPARTMENT CONNECTION INSTALLATION
  - A. Install ball drip valves at each check valve for fire department connection to mains.
  - B. Install protective pipe bollards on two sides of each fire department connection. Pipe bollards are specified in Section 05 50 00 - Metal Fabrications.
- 3.16 ALARM DEVICE INSTALLATION
  - A. General: Comply with NFPA 24 for devices and methods of valve supervision. Underground valves with valve box do not require supervision.
  - B. Supervisory Switches: Supervise valves in open position.
    - 1. Valves: Grind away portion of exposed valve stem. Bolt switch, with plunger in stem depression, to OS&Y gate-valve yoke.
    - 2. Indicator Posts: Drill and thread hole in upper-barrel section at target plate. Install switch, with toggle against target plate, on barrel of indicator post.
  - C. Locking and Sealing: Secure unsupervised valves as follows:
    - 1. Valves: Install chain and padlock on open OS&Y gate valve.
    - 2. Post Indicators: Install padlock on wrench on indicator post.
  - D. Pressure Switches: Drill and thread hole in exposed barrel of fire hydrant. Install switch.
  - E. Connect alarm devices to building fire alarm system. Wiring and fire-alarm devices are specified in Section 28 46 21.11 – Addressable Fire Alarm Systems.

3.17 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping and specialties.
- B. See Plumbing Sections for piping connections to valves and equipment.
- C. Connect water-distribution piping to utility water main. Use tapping sleeve and tapping valve or to local utility specifications.
- D. Connect water-distribution piping to interior domestic-water and fire-suppression piping.
- E. Connect waste piping from drinking fountains to sanitary sewerage system. See Section 33 30 00 - Sanitary Sewerage for connection to sanitary-sewer piping.
- F. Ground equipment according to Division 26 requirements for Grounding.
- 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.

3.18 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered and after thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: Test at not less than 1-1/2 times working pressure for 2 hours.
  - 1. Increase pressure in 50-psig (350-kPa) increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig (0 kPa). Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts (1.89 L) per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
- C. Prepare reports of testing activities.

3.19 IDENTIFICATION

- A. Install continuous underground detectable warning tape during backfilling of trench for underground water-service piping. Locate below finished grade, directly over piping. See Earthwork Section for underground warning tapes.
- B. Permanently attach equipment nameplate or marker, indicating plastic water-service piping, on main electrical meter panel. See Plumbing Specifications for additional identification requirements.

3.20 CLEANING

- A. Clean and disinfect water-distribution piping as follows:
  - 1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
  - 2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
  - 3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or as described below:
    - a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.

- b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
  - c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
  - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
- B. Prepare reports of purging and disinfecting activities.
- C. After completing drinking fountain installation, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish. Clean drinking fountains, on completion of installation, according to manufacturer's written instructions.

END OF SECTION



PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sanitary sewerage outside the building.

1.02 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections.  
1. Section 03 30 00 – Cast-in-Place Concrete.

1.03 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.  
B. EPDM: Ethylene-propylene-diene-monomer rubber.  
C. PE: Polyethylene plastic.  
D. PVC: Polyvinyl chloride plastic.

1.04 PERFORMANCE REQUIREMENTS

- A. Gravity-Flow, Nonpressure-Piping Pressure Ratings: At least equal to system test pressure.  
B. Force-Main Pressure Ratings: At least equal to system operating pressure, but not less than 150 psig.

1.05 REFERENCES

- A. ACI – American Concrete Institute:  
1. ACI 318 – Building Code Requirements and Commentary.  
2. ACI 350R - Code Requirements for Environmental Engineering Concrete Structures and commentary.
- B. ASME – American Society of Mechanical Engineers  
1. ASME A112.36.2M – Cleanouts.
- C. ASTM International:  
1. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.  
2. ASTM A1064 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.  
3. ASTM A536 - Standard Specification for Ductile Iron Castings.  
4. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.  
5. ASTM A674 - Standard Practice for Polyethylene Encasement for Ductile Iron Pipe.  
6. ASTM A746 – Standard Specification for Ductile Iron Gravity Sewer Pipe.  
7. ASTM C33 - Standard Specification for Concrete Aggregates.  
8. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.  
9. ASTM C478 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections.  
10. ASTM C564 – Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.  
11. ASTM C890 – Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.  
12. ASTM C891 - Standard Practice for Installation of Underground Precast Concrete Utility Structures.  
13. ASTM C923 – Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.

14. ASTM C969 - Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines and Manholes.
  15. ASTM C1173 - Standard Specification for Flexible Transition Couplings for Underground Piping Systems.
  16. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
  17. ASTM D3034 – Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
  18. ASTM D4101 - Standard Classification System and Basis for Specification for Polypropylene Injection and Extrusion Materials.
  19. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- D. AWWA – American Water Works Association:
1. AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
  2. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
  3. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
  4. AWWA C153 – Ductile-Iron Compact Fittings.
  5. AWWA C219 – Bolted, Sleeve-Type Couplings for Plain-End Pipe.
  6. AWWA C600 – Installation of Ductile-Iron Mains and Their Appurtenances.
  7. AWWA M23 - PVC Pipe - Design and Installation, Third Edition.
- E. Uni-Bell PVC Pipe Association:
1. UNI-B-6 – Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe.

#### 1.06 SUBMITTALS

- A. Product Data: For the following:
1. Stainless-steel drainage systems.
  2. Backwater valves and cleanouts.
  3. Manhole cover inserts.
- B. Shop Drawings: Include plans, elevations, details, and attachments for the following:
1. Precast concrete manholes, including frames and covers.
  2. Cast-in-place concrete manholes and other structures, including frames and covers.
- C. Coordination Drawings: Show manholes and other structures, pipe sizes, locations, and elevations. Include details of underground structures and connections. Show other piping in same trench and clearances from sewerage system piping. Indicate interface and spatial relationship between piping and proximate structures.
- D. Coordination Profile Drawings: Show system piping in elevation. Draw profiles at horizontal scale of not less than 1 inch equals 50 feet and vertical scale of not less than 1 inch equals 5 feet. Indicate underground structures and pipe. Show types, sizes, materials, and elevations of other utilities crossing system piping.
- E. Design Mix Reports and Calculations: For each class of cast-in-place concrete.
- F. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

#### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic structures, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle precast concrete manholes and other structures according to manufacturer's written rigging instructions.

1.08 PROJECT CONDITIONS

- A. Site Information: Perform site survey, research public utility records, and verify existing utility locations.
- B. Locate existing structures and piping to be closed and abandoned.
- C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
  - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without Architect's written permission.

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:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Stainless-Steel Drainage Systems:
    - a. Josam Co.; Blucher-Josam Div.
  - 2. Gray-Iron Backwater Valves and Cleanouts:
    - a. Josam Co.
    - b. McWane, Inc.; Tyler Pipe; Wade Div.
    - c. Smith: Jay R. Smith Mfg. Co.
    - d. Watts Industries, Inc.; Ancon Drain Div.
    - e. Watts Industries, Inc.; Enpoco, Inc. Div.
    - f. Zurn Industries, Inc.; Hydromechanics Div.
  - 3. PVC Backwater Valves and Cleanouts:
    - a. Canplas, Inc.
    - b. IPS Corp.
    - c. NDS, Inc.
    - d. Plastic Oddities, Inc.
    - e. Sioux Chief Manufacturing Co., Inc.
  - 4. Manhole Cover Inserts:
    - a. FRW Industries, Inc.
    - b. Knutson Manufacturing Co.
    - c. Parson Environmental Products, Inc.

2.02 PIPING MATERIALS

- A. Ductile-Iron Sewer Pipe: ASTM A746, for push-on joints.
  - 1. Compact-Pattern, Ductile-Iron Fittings: AWWA C153, for push-on joints.
  - 2. Gaskets: AWWA C111, rubber.
- B. PVC Sewer Pipe and Fittings: According to the following:
  - 1. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: ASTM D3034, SDR 35, for solvent-cemented or gasketed joints.
    - a. Gaskets: ASTM F477, elastomeric seals.

2.03 SPECIAL PIPE COUPLINGS AND FITTINGS

- A. Sleeve-Type Pipe Couplings: ASTM C1173, rubber or elastomeric sleeve and band assembly fabricated to mate with OD of pipes to be joined, for nonpressure joints.
  - 1. Sleeve Material for Concrete Pipe: ASTM C443, rubber.
  - 2. Sleeve Material for Cast-Iron Soil Pipe: ASTM C564, rubber.

3. Sleeve Material for Plastic Pipe: ASTM F477, elastomeric seal.
  4. Sleeve Material for Dissimilar Pipe: Compatible with pipe materials being joined.
  5. Bands: Stainless steel, at least one at each pipe insert.
- B. Bushing-Type Pipe Couplings: ASTM C1173, rubber or elastomeric bushing fabricated to mate with OD of smaller pipe and ID of adjoining larger pipe, for nonpressure joints.
1. Material for Concrete Pipe: ASTM C443, rubber.
  2. Material for Cast-Iron Soil Pipe: ASTM C564, rubber.
  3. Material for Plastic Pipe: ASTM F477, elastomeric seal.
  4. Material for Dissimilar Pipe: Compatible with pipe materials being joined.
- C. Pressure-Type Pipe Couplings: AWWA C219, iron-body sleeve assembly matching OD of pipes to be joined, with AWWA C111 rubber gaskets, bolts, and nuts. Include PE film, pipe encasement.
- D. Ductile-Iron Expansion Joints: Three-piece assembly of telescoping sleeve with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Include rating for 250 psig minimum working pressure and for expansion indicated. Include PE film, pipe encasement.

2.04 PE FILM, PIPE ENCASEMENT

- A. ASTM A674 or AWWA C105; PE film, tube, or sheet; 8 mil thickness.

2.05 MANHOLES

- A. Normal-Traffic Precast Concrete Manholes: ASTM C478, precast, reinforced concrete, of depth indicated, with provision for rubber gasketed joints.
1. Diameter: 48 inches minimum, unless otherwise indicated.
  2. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
  3. Base Section: 6 inch minimum thickness for floor slab and 4 inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
  4. Riser Sections: 4 inch minimum thickness, and lengths to provide depth indicated.
  5. Top Section: Eccentric-cone type, unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
  6. Gaskets: ASTM C443, rubber.
  7. Grade Rings: Include two or three reinforced-concrete rings, of 6 to 9 inch total thickness, that match 24 inch diameter frame and cover.
  8. Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast or anchor into base, riser, and top section sidewalls with steps at 12 to 16 inch intervals. Omit steps for manholes less than 60 inches deep.
  9. Steps: ASTM C478 (ASTM C478M), individual steps or ladder. Omit steps for manholes less than 60 inches (1500 mm) deep.
  10. Pipe Connectors: ASTM C923, resilient, of size required, for each pipe connecting to base section.
- B. Cast-in-Place Concrete Manholes: Construct of reinforced-concrete bottom, walls, and top; designed according to ASTM C890 for A-16, heavy-traffic, structural loading; of depth, shape, dimensions, and appurtenances indicated.
1. Ballast: Increase thickness of concrete, as required to prevent flotation.
  2. Grade Rings: Include two or three reinforced-concrete rings, of 6 to 9 inch (150 to 229 mm) total thickness, that match 24 inch (610 mm) diameter frame and cover.
  3. Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast or anchor into sidewalls with steps at 12 to 16 inch intervals. Omit steps for manholes less than 60 inches deep.

4. Steps: Manufactured from deformed, 1/2 inch (13 mm) steel reinforcement rod complying with ASTM A615/A615M and encased in polypropylene complying with ASTM D4101. Include pattern designed to prevent lateral slippage off step. Cast or anchor into sidewalls with steps at 12 to 16 inch (300 to 400 mm) intervals. Omit steps for manholes less than 60 inches (1,500 mm) deep.
- C. Manhole Frames and Covers: ASTM A536, Grade 60-40-18, ductile-iron castings designed for heavy-duty service. Include 24 inch ID by 7 to 9 inch riser with 4 inch minimum width flange, and 26 inch diameter cover. Include indented top design with lettering "SANITARY SEWER" cast into cover.
- D. Manhole Cover Inserts: Manufactured, plastic form, of size to fit between manhole frame and cover and designed to prevent stormwater inflow. Include handle for removal and gasket for gastight sealing.
  1. Type: Solid.
  2. Type: With drainage and vent holes.
  3. Type: With valve.

## 2.06 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:
  1. Cement: ASTM C150, Type II.
  2. Fine Aggregate: ASTM C33, sand.
  3. Coarse Aggregate: ASTM C33, crushed gravel.
  4. Water: Potable.
- B. Portland Cement Design Mix: 4,000 psi minimum, with 0.45 maximum water-cementitious materials ratio.
  1. Reinforcement Fabric: ASTM A1064, steel, welded wire fabric, plain.
  2. Reinforcement Bars: ASTM A615/A615M, Grade 60, deformed steel.
- C. Structure Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4,000 psi minimum, with 0.45 maximum water-cementitious materials ratio. Include channels and benches in manholes.
  1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
    - a. Invert Slope: 2 percent through manhole.
  2. Benches: Concrete, sloped to drain into channel.
    - a. Slope: 4 percent.
- D. Ballast and Pipe Supports: Portland cement design mix, 3,000 psi minimum, with 0.58 maximum water-cementitious materials ratio.
  1. Reinforcement Fabric: ASTM A1064, steel, welded wire fabric, plain.
  2. Reinforcement Bars: ASTM A615/A615M, Grade 60, deformed steel.

## 2.07 PROTECTIVE COATINGS

- A. Description: One- or two-coat, coal-tar epoxy; 15 mil minimum thickness, unless otherwise indicated; factory or field applied to the following surfaces:
  1. Concrete Manholes: On interior surface.
  2. Manhole Frames and Covers: On surfaces that will be exposed to sewer gases.

## 2.08 CLEANOUTS

- A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside caulk or spigot connection and countersunk, tapered-thread, brass closure plug. Use units with top-loading classifications according to the following applications:
  1. Light Duty: In earth or grass foot-traffic areas.

2. Medium Duty: In paved foot-traffic areas.
  3. Heavy Duty: In vehicle-traffic service areas.
  4. Extra-Heavy Duty: In roads.
  5. Sewer Pipe Fitting and Riser to Cleanout: ASTM A74, Service class, cast-iron soil pipe and fittings.
- B. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

### PART 3 EXECUTION

#### 3.01 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 31 20 00 – Earthwork.

#### 3.02 IDENTIFICATION

- A. Materials and their installation are specified in Section 31 20 00 – Earthwork. Arrange for installing green warning tapes directly over piping and at outside edges of underground structures.
1. Use warning tape or detectable warning tape over ferrous piping.
  2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

#### 3.03 PIPING APPLICATIONS

- A. General: Include watertight joints.
- B. Refer to Part 2 of this Section for detailed specifications for pipe and fitting products listed below. Use pipe, fittings, and joining methods according to applications indicated.
- C. Gravity-Flow Piping: Use the following:
1. NPS 3: Ductile-iron sewer pipe; standard-pattern, ductile-iron fittings; gaskets; and gasketed joints, unless otherwise indicated on the drawings.
  2. NPS 4 and NPS 6: Ductile-iron sewer pipe; standard-pattern, ductile-iron fittings; gaskets; and gasketed joints, unless otherwise indicated on the drawings.
  3. NPS 4 and NPS 6: ABS, SDR 35, sewer pipe and fittings; gaskets and gasketed joints, only where indicated on the drawings.
  4. NPS 8 and NPS 10: Ductile-iron sewer pipe; standard-pattern, ductile-iron fittings; gaskets; and gasketed joints, unless otherwise indicated on the drawings.
  5. NPS 8 and NPS 10 (DN200 and DN250): PVC sewer pipe and fittings, gaskets and gasketed joints, only where indicated on the drawings.
  6. NPS 12 to NPS 16 (DN300 to DN400): Ductile-iron sewer pipe, standard-pattern, ductile-iron fittings, gaskets; d gasketed joints, unless otherwise indicated on the drawings.
  7. NPS 12 and NPS 15: PVC sewer pipe and fittings, gaskets and gasketed joints, only where indicated on the drawings.
  8. Pipe Sizes NPS 18 to NPS 24 (DN450 to DN600): Ductile-iron sewer pipe; standard-pattern, ductile-iron fittings; gaskets; and gasketed joints.

#### 3.04 SPECIAL PIPE COUPLING AND FITTING APPLICATIONS

- A. Special Pipe Couplings: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.
1. Use the following pipe couplings for nonpressure applications:
    - a. Sleeve type to join piping, of same size, or with small difference in OD.
    - b. Increaser/reducer-pattern, sleeve type to join piping of different sizes.
    - c. Bushing type to join piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
  2. Use pressure-type pipe couplings for force-main joints. Include PE film, pipe encasement.

- B. Special Pipe Fittings: Use where indicated. Include PE film, pipe encasement.

### 3.05 INSTALLATION, GENERAL

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements. Maintain swab or drag in line, and pull past each joint as it is completed.
- C. Use manholes for changes in direction, unless fittings are indicated. Use fittings for branch connections, unless direct tap into existing sewer is indicated.
- D. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. Install gravity-flow piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.
1. Install piping pitched down in direction of flow, at minimum slope of 2 percent, unless otherwise indicated.
  2. Install piping with 36 inch minimum cover, unless otherwise indicated on the drawings.
- F. Extend sanitary sewerage piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.

### 3.06 PIPE JOINT CONSTRUCTION AND INSTALLATION

- A. General: Join and install pipe and fittings according to installations indicated.
- B. Ductile-Iron Sewer Pipe with Ductile-Iron Fittings: According to AWWA C600.
1. Install PE film, pipe encasement over ductile-iron sewer pipe and ductile-iron fittings according to ASTM A674 or AWWA C105.
- C. PVC Sewer Pipe and Fittings: As follows:
1. Join pipe and gasketed fittings with gaskets according to ASTM D2321.
  2. Join profile sewer pipe fittings with gaskets according to ASTM D2321 and manufacturer's written instructions.
  3. Install according to ASTM D2321.
- D. System Piping Joints: Make joints using system manufacturer's couplings, unless otherwise indicated.
- E. Join piping made of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and that fit both systems' materials and dimensions.
- F. Install with top surfaces of components, except piping, flush with finished surface.

### 3.07 MANHOLE INSTALLATION

- A. General: Install manholes, complete with appurtenances and accessories indicated.
- B. Form continuous concrete channels and benches between inlets and outlet.
- C. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated.

- D. Install precast concrete manhole sections with gaskets according to ASTM C891.
- E. Construct cast-in-place manholes as indicated.

### 3.08 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318 and ACI 350R.

### 3.09 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
- B. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 x 18 x 12 inches deep. Set with tops 1 inch above surrounding grade.
- C. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

### 3.10 TAP CONNECTIONS

- A. Make connections to existing piping and underground structures so finished Work complies as nearly as practical with requirements specified for new Work.
- B. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6 inch overlap, with not less than 6 inches of concrete with 28 day compressive strength of 3,000 psi .
- C. Make branch connections from side into existing piping, NPS 4 to NPS 20 . Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye with not less than 6 inches of concrete with 28 day compressive strength of 3,000 psi .
- D. Make branch connections from side into existing piping, NPS 21 or larger, or to underground structures by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall, unless otherwise indicated. On outside of pipe or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
  - 1. Use concrete that will attain minimum 28 day compressive strength of 3,000 psi, unless otherwise indicated.
  - 2. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
- E. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

### 3.11 CLOSING ABANDONED SANITARY SEWERAGE SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
  - 1. Close open ends of piping with at least 8 inch- thick, brick masonry bulkheads.
  - 2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Structures: Excavate around structure as required and use one procedure below:
  - 1. Remove structure and close open ends of remaining piping.

2. Remove top of structure down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
3. Backfill to grade according to Section 31 20 00 – Earthwork.

### 3.12 FIELD QUALITY CONTROL

- A. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed.
  1. Place plug in end of incomplete piping at end of day and when work stops.
  2. Flush piping between manholes and other structures to remove collected debris, if required by authorities having jurisdiction.
- B. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
  1. Submit separate reports for each system inspection.
  2. Defects requiring correction include the following:
    - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    - c. Crushed, broken, cracked, or otherwise damaged piping.
    - d. Infiltration: Water leakage into piping.
    - e. Exfiltration: Water leakage from or around piping.
  3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
  4. Reinspect and repeat procedure until results are satisfactory.
- C. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
  1. Do not enclose, cover, or put into service before inspection and approval.
  2. Test completed piping systems according to authorities having jurisdiction.
  3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
  4. Submit separate reports for each test.
  5. If authorities having jurisdiction do not have published procedures, perform tests as follows:
    - a. Sanitary Sewerage: Perform hydrostatic test.
      - i. Allowable leakage is maximum of 50 gal. per inch of nominal pipe size per mile of pipe, during 24 hour period.
      - ii. Close openings in system and fill with water.
      - iii. Purge air and refill with water.
      - iv. Disconnect water supply.
      - v. Test and inspect joints for leaks.
      - vi. Option: Test ductile-iron piping according to AWWA C600, Section "Hydrostatic Testing." Use test pressure of at least 10 psig .
    - b. Sanitary Sewerage: Perform air test according to UNI-B-6.
    - c. Force Main: Perform hydrostatic test after thrust blocks, supports, and anchors have hardened. Test at pressure not less than one and one-half times maximum system operating pressure, but not less than 150 psig (1,035 kPa).
      - i. Ductile-Iron Piping: Test according to AWWA C600, Section "Hydraulic Testing."
      - ii. PVC Piping: Test according to AWWA M23, "Testing and Maintenance" Chapter.
  6. Manholes: Perform hydraulic test according to ASTM C 969 (ASTM C 969M).
  7. Leaks and loss in test pressure constitute defects that must be repaired.

8. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. The work under this section includes, but is not limited to, furnishing all labor, materials, and equipment required to install, field test, and place into satisfactory operation the duplex pump station specified herein. Pumps and mechanical accessories shall be installed within the wet well as illustrated on the project plans. A factory built system consisting of duplex controls, valves, piping, and pressure gauges contained in a fiberglass enclosure and mounted on a factory engineered wet well cover shall be provided by the system manufacturer as shown on the project drawings and specified herein.
- B. The general provisions of the contract, including the General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this section.

### 1.02 REFERENCES

- A. Publications listed below form part of this specification to extent referenced in the text by basic designation only. Consult latest edition of publication unless otherwise noted.
  - 1. American National Standards Institute (ANSI) and American Water Works Association (AWWA)
    - a. ANSI B16.1 Cast iron pipe flanges and flanged fittings
    - b. ANSI/AWWA C115/A21.51 Cast/ductile iron pipe with threaded flanges
    - c. ANSI 253.1 Safety Color Code for Marking Physical Hazards
    - d. ANSI B40.1 Gauges, Pressure and Vacuum
    - e. AWWA C508 Single Swing Check Valves
    - f. AWWA C504 Plug Valves
  - 2. American Society for Testing and Materials (ASTM)
    - a. ASTM A48 Gray Iron Castings
    - b. ASTM A126 Valves, Flanges, and Pipe Fittings
    - c. ASTM A307 Carbon Steel Bolts and Studs
    - d. ASTM F593 Stainless Steel Bolts, Hex Cap Screws, and Studs
    - e. ASTM A36 Structural Steel
  - 3. Institute of Electrical and Electronics Engineers (IEEE)
    - a. ANSI/IEEE Std. 100 Standard Dictionary of Electrical Terms
    - b. ANSI/IEEE Std. 112 Test Procedure for Polyphase Induction Motors
    - c. IEEE Std. 242 Protection of Industrial and Control Power Systems.
  - 4. National Electric Code (NEC) / National Electrical Manufacturers Assoc. (NEMA)
    - a. NEC National Electric Code
    - b. NEC 701 National Electric Code article 701
    - c. NEMA Std. MG1 Motors and Generators
  - 5. Miscellaneous References
    - a. Ten-State Standards Recommended Standards for Sewage Works
    - b. Hydraulic Institute Standard for Centrifugal, Rotary and Reciprocating Pumps
    - c. NMTBA and JIC Std. National Machine Tool Builders Association and Joint Industrial Council Standards

### 1.03 SYSTEM DESCRIPTION

- A. The contractor shall furnish and install one pre-engineered, factory-built, automatically controlled above ground valve package station with submersible pumps capable of handling raw unscreened sewage, sludge, and similar domestic liquids.
- B. The pumps and guide rail accessories shall be installed in the wet well as shown on the project plans. The pump control panel, liquid level control, valves, piping, and pressure gauges shall be installed within a factory built fiberglass enclosure and mounted on a factory engineered wet well cover.

- C. The factory-built pump station design, materials of construction, pumps, valves, piping, and motor/electrical controls shall be in accordance with the requirements listed under PART 2 - PRODUCTS of this specification section.

1.04 DESCRIPTION OF WORK REQUIRED

- A. The extent of work required and requirements for the wastewater pumping station for this project are shown on the project drawings and described herein.
- B. The work required at each wastewater pump station shall include, but is not limited to, the following:
1. Site grading, erosion control, weed control, construction of access roadway, gravel, and potable water service to the site as shown on the Plans.
  2. Installation of one factory-built prefabricated wastewater pump station as specified herein.
  3. Piping required for each pump station, including all factory-furnished and installed piping, valves, fittings, Quick Discharge Connector, base elbow, submersible pumps, contractor-furnished piping and valves, stainless steel pump guide rails, and force main piping as specified herein, or as shown on the Plans.
  4. Electrical work required for each pump station: main electrical service with utility meter and disconnect, station lighting as may be shown on the Plans, installation of an alarm light at each station, and all necessary conduit and wiring that may be required to provide power for proper installation and operation.
  5. Pump station security fence as indicated on the Plans.
  6. Finish work as required to complete the installation of the pump station: finish grading, erosion control, weed control, sod and/or grass seed, shrubbery, other landscaping indicated on the Plans.
- C. The Contractor shall furnish and install, as shown on the Plans and specified herein, one factory-built automatic duplex submersible pump station. The station provided for this project shall comply with the detailed descriptions that follow.
1. The principal items of equipment to be provided with each pump station shall include two submersible centrifugal solids handling pumps, each with compatible Quick Discharge Connector system, guide rails, anchor bolts, stainless steel lifting cables or chain with associated hardware, a steel reinforced polymer concrete station top slab with integral aluminum wet well access cover, station valves, internal piping of the sizes indicated herein or on the Plans, and a complete factory-built motor control center with circuit breakers, motor starters and automatic liquid level control system as specified herein to constitute a complete, working system.
  2. The pump station provided for this project shall be the EP1 (Above-Ground Valve Package) manufactured by EBARA Pumps Americas Corporation. Submersible solids handling pumps shall be Ebara Model D Series; specific pump size, impeller type and motor HP as indicated elsewhere herein.
  3. Alternates proposed for use on this project shall be considered only if full and complete pre-submittal data for all proposed equipment is received no later than fifteen (15) calendar days prior to the bid date. Pre-submittal shall comply with the requirements of Section 1.06 below. The decision of the engineer regarding the equality of proposed alternates is final, and resubmittal of equipment will not be allowed.
- D. The pumps and all mechanical accessories provided for each sewage pump station will be installed in and/or on each wet well as indicated on the Plans and as outlined herein.
1. The duplex control panel, liquid level control system, valves, piping, and pressure gauges necessary to provide a complete working system shall be installed inside a heavy-duty factory-built fiberglass enclosure.
  2. Each complete sewage pump station shall be a regular production item of the submersible pump manufacturer, not a locally assembled compilation of parts and/or components by a third party. The use of conventional station designs which utilize external concrete or fiberglass below-ground valve vaults, exposed control panels, bare concrete slab construction or concrete poured inside a fiberglass shell where it may be exposed to condensation of sewage gases (not steel reinforced

polymer concrete as specified), or the use of fabricated steel construction is not be considered equivalent to the specified factory-built system, and shall not be furnished.

1.05 PERFORMANCE CRITERIA

- A. Each pump shall be designed to handle raw, unscreened domestic sanitary sewage and pass up to a 3" sphere. Pumps shall be furnished with a minimum 3" discharge connection. Each pump shall be selected to deliver 100 GPM at a design head of 34 feet TDH, with a minimum shutoff head of 58 feet.
- B. Site power furnished to pump station shall be 3 phase, 60 hertz, 230 volts. Voltage tolerance shall be plus or minus 10 percent. Phase-to-phase unbalance shall not exceed 1% average voltage as set forth in NEMA standard MG-1. Control voltage shall not exceed 120 volts.

1.06 SUBMITTALS

- A. Product Data
  - 1. Prior to fabrication, the pump station manufacturer shall submit an electronic copy of submittal data for review and approval. Additional copies will be provided as required to comply with the contractor, supplier, or manufacturer's need for extra returned copies.
  - 2. Submittal shall include shop drawings, electrical ladder logic drawings, and support data as follows: Catalog cuts sheets reflecting characteristics for major items of equipment, materials of construction, major dimensions, motor data, pump characteristic curves to illustrate the design duty point capacity (GPM), head (FT), pump efficiency (np), and brake horsepower (BHP). Electrical components used in the motor branch and liquid level control shall be fully described.
  - 3. Shop drawings shall provide layout of mechanical equipment and anchor bolt locations for the Quick Discharge Connector, base elbow, and guide rail components. Pipe penetrations and station access clearances shall be dimensioned relative to the station centerline. Electrical ladder logic drawings shall illustrate motor branch and liquid level control circuits to the extent necessary to validate function and integration of circuits to form a complete working system.
- B. Operation & Maintenance Manuals
  - 1. Installation shall be in accordance with written instructions provided by the pump station manufacturer. Comprehensive instructions supplied at time of shipment shall enable personnel to properly install, operate, and maintain all equipment supplied. Content and instructions shall assume operations personnel are familiar with pumps, motors, piping and valves, but lack experience on the exact equipment supplied.
  - 2. Documentation shall be specific to the pump station supplied and collated in functional sections. Each section shall combine to form a complete system manual covering all aspects of equipment supplied by the station manufacturer. Support data for any equipment supplied by others, even if mounted or included in overall station design, shall be provided by those supplying the equipment and a separate section shall be so designated in the O&M Manual. Instructions shall include the following as a minimum:
    - a. Functional description of each major component, complete with operating instructions.
    - b. Instructions for operating pumps and pump controls in all modes of operation.
    - c. Calibration and adjustment of equipment for initial start-up, replacement of level control components, or as required for routine maintenance.
    - d. Support data for commercially available components not produced by the station manufacturer, but supplied in accordance with the specifications, shall be supported by literature from the prime manufacturer and incorporated as appendices.
    - e. Electrical schematic diagram of the pump station circuits shall be in accordance with NFPA70. Schematics shall illustrate, to the extent of authorized repair, pump motor branch, control and alarm system circuits including interconnections. Wire numbers and legend symbols shall be shown. Schematic diagrams for individual components, not normally repairable by the station operator, need not be included. Details for such parts shall not be substituted for an overall system schematic. Partial schematics, block

- diagrams, and simplified schematics shall not be provided in lieu of an overall system diagram.
- f. Mechanical layout drawing of the pump station and components, prepared in accordance with good commercial practice, shall provide installation dimensions and location of all pumps, valves and piping.
- 3. Operation and maintenance instructions that rely on vendor cut-sheets and literature that includes general configurations, or requires operations personnel to selectively read portions of the manual shall not be acceptable. Operation and maintenance instructions must be specific to equipment supplied in accordance with these specifications.

#### 1.07 QUALITY ASSURANCE

- A. Upon request from the engineer (or owner), the pump station manufacturer shall prove financial stability long-term performance and the ability to produce the specified station within the specified delivery schedules. At the request of the engineer (or owner) the pump station manufacturer shall provide evidence of facilities, inventory, equipment and expertise that demonstrates the manufacturer's commitment to long-term customer service and product support. Such evidence shall be demonstrated exclusively by a visit to the pump station manufacturer's facility by the engineer (or owner).
- B. The manufacturer must show proof of original product design and testing. Products violating intellectual property regulations shall not be allowed, as they violate international law and expose the user or engineer to unintended liabilities. "Reverse-engineered" products fabricated to substantially duplicate the design of an original product shall not be allowed, as they may contain substantial differences in tolerances and material applications addressed in the original design, which may contribute to product failure.
- C. The manufacturer must show basic pump station design configuration and equipment used in the pump station is standard product and has been factory tested, marketed as all components to be supplied have been assembled, operated, and tested to meet the requirements of these specifications.
- D. The term "pump manufacturer" or "pump station manufacturer" shall be defined as the entity which designs, fabricates, machines, assembles, hydraulically tests, and warrants the final product. Any entity that does not meet this definition will not be considered a "pump manufacturer" or "pump station manufacturer" and is not an acceptable supplier. For quality control reasons and to ensure future pump and parts availability, all major components of the pumps provided shall be readily available from the manufacturer's regular inventory in the United States of America.
- E. All pump openings and passages shall be of adequate size to pass 2.5" diameter spheres (minimum) and any trash or stringy material that can pass through an average house collection system.
- F. The manufacturer's technical representative shall inspect the completed installation, correct or supervise the correction of any defect or malfunction, and instruct operating personnel in the proper operation and maintenance of the equipment as described in Part 3 – EXECUTION of this specification section.

#### 1.08 MANUFACTURER'S EXPERIENCE REQUIREMENTS

- A. It is the specific intention of these specifications that the wastewater pump station furnished for this project be provided by a manufacturer with documented experience in the design, production, and successful installation of submersible sewage pumps and factory-built above-ground submersible pump stations.
  - 1. The station manufacturer shall have a minimum of ten (10) calendar years of experience in the production of submersible pumping equipment and shall have the facilities and personnel in place to provide support of the specified factory-built above-ground submersible pumping stations.
  - 2. The pumps, station base, piping assembly, and electrical control panel shall be a standard production item of the station manufacturer.
- B. No consideration will be given to manufacturers who cannot comply with all requirements of Section 1.05.

- C. Upon request from the Engineer, the equipment manufacturer shall document the existence of a factory-authorized service and repair facility within a reasonable distance of the job site prior to bidding the specified pump station.

#### 1.09 MANUFACTURER'S WARRANTY

- A. The pump station manufacturer shall warrant all equipment to be of quality construction, free of defects in material and workmanship. A written warranty shall include specific details described below:
  - 1. In addition to defects in material and workmanship, fiberglass reinforced polyester station enclosures are warranted for five (5) years to be resistant to rust, corrosion, corrosive soils, effects of airborne contamination or physical failures occurring in normal service for the period of the pump station warranty.
  - 2. All other equipment, apparatus, and parts furnished shall be warranted for five (5) years, excepting only those items that are normally consumed in service, such as light bulbs, oils, grease, packing, gaskets, O-rings, etc. The pump station manufacturer shall be solely responsible for warranty of the station and all components.
- B. Components that fail to perform as specified by the engineer, or as represented by the manufacturer, or as proven defective in service during the warranty period, shall be replaced, repaired, or satisfactorily modified by the manufacturer.
- C. It is not intended that the station manufacturer assume liability for consequential damages or contingent liabilities arising from failure of any vendor supplied product or part which fails to properly operate, however caused. Consequential damages resulting from defects in design, or delays in delivery are also beyond the manufacturer's scope of liability.
- D. Equipment supplied by others and incorporated into a pump station or enclosure is not covered by this limited warranty. Any warranty applicable to equipment selected or supplied by others will be limited solely to the warranty, if any, provided by the manufacturer of the equipment.
- E. This limited warranty shall be valid only when installation, use, and maintenance is performed in accordance with manufacturer recommendations. A start-up report completed by an authorized manufacturer's representative must be received by manufacturer within thirty (30) days of the initial date the unit is placed into service. The warranty shall become effective on the date of acceptance by the purchaser or the purchaser's authorized agent, or sixty (60) days after installation, or ninety (90) days after shipment from the factory, whichever occurs first.

### PART 2 PRODUCTS

#### 2.01 UNITARY RESPONSIBILITY

- A. In order to unify responsibility for proper operation of the complete pump station, it is the intent of these Specifications that all system components are furnished by a single supplier (unitary source). The pumping station must be of standard catalog design, totally warranted by the manufacturer. Under no circumstances will a pumping system consisting of parts compiled and assembled by a manufacturer's representative, distributor, or other source be accepted.

#### 2.02 MANUFACTURER

- A. The specifications and project drawings depict equipment and materials manufactured by EBARA Pumps Americas Corporation, which are deemed most suitable for the service anticipated. It is not intended to eliminate other products of equal quality and performance (refer to Section 1.04.C.3). However, the contractor shall prepare his bid based on the specified equipment for purposes of determining low bid. Award of a contract shall constitute an obligation to furnish the specified equipment and materials.

- B. After execution of the contract, the contractor may offer substitutions to the specified equipment for consideration. The equipment proposed for substitution must be in compliance with Section 1.04.C.3, superior in construction and performance to that specified in the contract, and the higher quality must be demonstrated by a list of current users of the proposed equipment in similar installations.
- C. In event the contractor obtains engineer's approval for equipment substitution, the contractor shall, at his own expense, make all resulting changes to the enclosures, buildings, piping or electrical systems as required to accommodate the proposed equipment. Revised detail drawings illustrating the substituted equipment shall be submitted to the engineer prior to acceptance.
- D. It will be assumed that if the cost to the contractor is less for the proposed substitution, then the contract price shall be reduced by an amount equal to the savings.

2.03 STATION ENCLOSURE

- A. The station enclosure shall contain and enclose all valves and associated controls and shall be constructed to enhance serviceability by incorporating the following design characteristics:
  - 1. Two access doors per side of the station enclosure shall be provided. Doors shall be sized and placed to permit routine maintenance operations through the door openings of the enclosure. For these purposes, routine maintenance shall include frequently performed adjustments and inspections of the electrical components, controls and valves. Minimum size of the door opening shall be 54" High X 72" Wide.
  - 2. The access doors shall be provided with a hinge and latch. Hinge shall be the continuous type. Latch shall engage the enclosure at not less than three places, and shall be protected by a keyed lock.
  - 3. One enclosure side shall contain a screened vent to maximize air flow for enclosure ventilation. The opposite side shall contain the blower and bypass pumping connections.
  - 4. The Station enclosure, less base, must be removable.
- B. The station enclosure shall be manufactured of molded reinforced Isophthalic polyester resins with a minimum of 30% fiberglass, and a maximum of 70% resin. Resin fillers or extenders shall not be used.
- C. Glass fibers shall have a minimum average length of 1-1/4 inches. Major design considerations shall be given to structural stability, corrosion resistance, and watertight properties. The polyester laminates shall provide a balance of mechanical, chemical, and electrical properties to insure long life. They must be impervious to micro- organisms, mildew, mold, fungus, corrosive liquids, and gases which can reasonably be expected to be present in the environment surrounding the wet well.
- D. The fiberglass core shall be 1-inch-thick with a minimum core insulating value of R~7 in accordance with on ASTM C518.
- E. All interior surfaces of the housing shall be coated with a polyester resin-rich finish. It shall provide:
  - 1. Maintenance-free service
  - 2. Abrasion resistance
  - 3. Protection from sewage, greases, oils, gasoline, and other common chemicals
  - 4. The outside of the enclosure shall be coated with a suitable pigmented resin, compounded to insure long maintenance-free life.
- F. An exhaust blower shall be provided. Blower capacity shall be sufficient to change station air a minimum of once every minute. Blower motor shall be operated automatically and shall be turned on at approximately 70 degrees F and shall be turn off at 55 degrees F. Blower motor and control circuit shall be protected by a thermal- magnetic air circuit breaker to provide overcurrent and overload protection. Blower exhaust outlet shall be designed to prevent the entrance of rain, snow, rocks, and foreign material.

2.04 STATION BASE

- A. Station base shall be constructed of pre-cast, steel-reinforced polymer concrete resistant to H<sub>2</sub>S and other harmful elements. It shall be designed to insure adequate strength to resist deformation of the structure during shipping, lifting, or handling. The enclosure base shall function at the wet well top and incorporate a duplex access cover, sized for the installation and removal of the specified pumps, and shall be of sufficient size to permit access to the wet well. Color used shall de-emphasize the presence of dirt, grease, etc., and shall be provided with a non-skid surface.
- B. A static wet well vent shall be mounted in the station base, and be housed in the station enclosure. The station enclosure shall provide a transition area between the wet well and the vent outlet. The vent shall terminate through the wall of the station enclosure with a screened opening designed to prevent the entrance of rain, snow, rocks and foreign material.
- C. The station base shall incorporate a cable transition adapter for the pump cables, level controls, and associated wiring. The adapter shall provide for a vapor tight transition between the wet well and the lift station enclosure. The adapter shall incorporate cable grips for each cable and be provided with a gasket between the adapter and the station for a positive seal. Junction boxes shall not be considered for cable transition.
- D. The station base shall be furnished with elastomeric compression sealing devices for all piping penetrations to provide for a vapor tight transition between the wet well and lift station enclosure.

2.05 APPURTENANCES

- A. The pump station shall be equipped with pressure gauges to monitor discharge pressures. Pressure gauges shall be isolated from the wastewater by isolator rings to assure accurate, repeatable pressure readings without compromising gauge function. Gauges shall be a minimum of 4 inches in diameter, and shall be graduated in feet water column. Rated accuracy shall be 1 percent of full scale reading. Pressure gauge shall be graduated 0 to 140 feet water column minimum. Gauge kit shall be board mounted and complete with all stainless steel hoses and stainless steel fittings as specified in Section 2.09.F.
- B. If the station wet well depth exceeds twenty (20) feet in depth, each pump shall be equipped with a welded 304 stainless steel intermediate guide rail bracket to maintain provide guide rail splicing and support.
- C. Compression couplings shall be provided for each discharge connection to join the contractor-provided plain-end ductile iron pipe to wet well piping. Coupling size shall match the header piping provided inside the fiberglass enclosure. Thrust clamps, also sized to match the header piping, shall be provided to eliminate movement of the piping inside the fiberglass enclosure as a result of hydraulic thrust during operation.

2.06 PUMP DESIGN

- A. The manufacturer of the pumps must be certified to ISO 9001 and ISO 14001 by an accredited certification agency.
- B. Pump performance criteria for each station are as follows:
  - 1. Primary Design Condition: 100 GPM @ 34' TDH
  - 2. Pump Efficiency at Primary Design: 46%
  - 3. Minimum shutoff head: 58'
  - 4. Motor Size: 3 HP
  - 5. Motor Speed: 1730 RPM
  - 6. Impeller Design: Semi Open
  - 7. Minimum Sphere Size: 3" Diameter
  - 8. EBARA Model: 80DLMKFU62.2

9. Station Piping: 4"

NOTE: Diameter Station Piping noted above refers to the size of the piping and valves in the pump station enclosure, as specified elsewhere herein. Where base elbow sizing differs from this size, the pump station manufacturer shall be responsible for providing any increasing fittings as required to adapt to the station piping size shown, and coordinate the location of the base elbows and increaser fittings in the wet well to provide proper fit.

- C. The pump casing shall be manufactured of ASTM A-48 Class 30 gray iron and shall be centerline discharge with a large radius on the cut-water to prevent clogging. The casing shall be provided with an integral 125# discharge flange. The pump casing shall be easily removable for full inspection of impeller. All pump openings and passages shall be of adequate size to pass 3" diameter spherical solids (minimum) and any trash or stringy material which can pass through an average house collection system.
- D. The impeller shall be radial single or multi-vane, semi-open design. It shall be dynamically balanced and shall be designed for solids handling with a long thrulet without acute turns. The inlet edge of the impeller vanes shall be angled toward the impeller periphery so as to facilitate the release of objects that might otherwise clog the pump. The 2 to 5 HP impeller design shall also include back pump out vanes to reduce the pressure and entry of foreign materials into the mechanical seal area. In addition, a lip seal shall be located behind the impeller hub to further reduce the entry of foreign materials into the seal area. Impellers shall be direct connected to the motor shaft with a slip fit, key driven, and secured with an impeller bolt. The design shall include a replaceable cast iron suction cover. The suction cover shall contain a groove(s) perpendicular to the suction opening to disrupt fibrous solids that may otherwise become lodged between the impeller and suction cover. The suction cover shall be designed such that it may be adjusted to maintain working clearances and hydraulic efficiencies.
- E. A lifting bail shall provide for proper balance of pump during installation and removal.
- F. All other major pump components such as motor housing, seal housing, and bearing housing shall be ASTM A-48, Class 30 gray iron. All castings shall have smooth surfaces devoid of blow holes or other casting irregularities. All mating surfaces of major components shall be machined and fitted with NBR O-rings to provide for a watertight seal. Machining and fit of the castings shall be such that the seal is accomplished by automatic compression of O-rings in two planes and O-ring contact is made on four surfaces without the requirement of specific torque limits. All internal and external surfaces coming into contact with pumped media shall be prepared to SPPC- VISI-SP-3-63 then coated with a zinc-chromate primer. External surfaces shall be coated with Coal Tar Epoxy paint; Tnemec Series 46 Hi Build Tnemec-Tar. All exposed fasteners shall be of 304 series stainless steel.
- G. Two separate mechanical seals shall be provided, arranged in tandem. The upper seal shall have a carbon rotating face and ceramic stationary face. The lower seal shall incorporate silicon carbide or tungsten carbide on both the rotating and stationary faces. Springs and metal parts shall be stainless steel and elastomers shall be Viton or Buna-N.
  - 1. The rotating seal faces shall be lubricated from an oil filled reservoir between pump and motor; the oil serving as both lubricating and a cooling media. The reservoir shall have separate oil fill and drain plugs to ensure accuracy when measuring lubricant level and for ease of maintenance.
  - 2. Seal shall require no special maintenance or routine adjustment; however, shall be easily inspected or replaced. No seal damage shall result from operating the pump for short periods of time without liquid.
  - 3. Mechanical seal failure shall be detected by means of a mechanical float switch located in a chamber above the seal. The seal fail switch shall be comprised of a magnetic float that actuates a dry reed switch encapsulated within the stem. In the event of mechanical seal failure liquid shall be directed into the float chamber, in which the rising liquid activates the switch opening the normally closed circuit. For units 2-10 HP the float body and float shall be a polypropylene material with a 316SS stopper. For units 15 HP and greater, the float switch components shall be

304SS. The leakage detector shall be suitable for operation on 120VAC control voltage, and shall be wired to the control panel by the contractor.

- H. The motor and pump must be connected to form an integral unit. Motor shall be a squirrel-cage, induction type in an air-filled water-tight enclosure. Oil-filled motors shall not be acceptable. The motor shall conform to NEMA B design standards and incorporate Class F insulation materials to withstand a continuous operating temperature of 1550C (3110F). The pump and motor shall be capable of handling liquids with a maximum temperature of 400C (1040F). Voltage and frequency tolerances shall be a maximum 10 / 5% respectively.
1. The motor shall be capable of sustaining a minimum of 20 starts per hour and shall be inverter duty rated in accordance with NEMA MG1 specifications. The motor shall be non-overloading throughout specified range of operation and be suitable for intermittent operation at full load while unsubmerged without damage to the unit. The motor shall not require a cooling jacket or any other means of auxiliary cooling during normal continuous operation.
  2. Bi-metallic sensors shall be embedded in each phase of the motor windings. Each switch shall open independently and terminate motor operation if temperature of the protected winding reaches the high temperature set point of 140OC (289OF) and shall automatically reset upon cooling of the winding. These thermal devices shall be suitable for operation on 120VAC control voltage, and shall be wired to the control panel by the contractor.
  3. Motor housing shall be ASTM A48 Class 30 cast iron. The stator shall consist of copper windings dipped and baked three times in Class H varnish rated for 1550C (3110F). The stator shall be held securely in place by a heat-shrink fit into the motor housing. Any other means of securing the stator that require keys, pins, or penetration of the motor housing shall not be considered acceptable. Rotor bars and short circuit rings shall be manufactured of cast aluminum. Motor shaft shall be a one-piece Stainless Steel AISI403 or AISI420 material, rotating on two permanently lubricated ball bearings designed for a minimum B-10 life of 60,000 hours.
  4. Combined rotor and shaft assembly shall be dynamically balanced for vibration- free operation.
- I. Power cable jacket shall be manufactured of an oil resistant chloroprene rubber material, designed for submerged applications. Cable shall be watertight to a depth of a least 65 feet. Power and control cables shall enter the motor through the top of the motor housing to an isolated junction area where internal connections are made. The cable entry system shall be comprised of primary, secondary, and tertiary sealing methods. The primary seal shall be a cylindrical elastomeric grommet designed to seal the exterior of the cable and the interior of the cast component when compressed between the motor cover and a 304SS washer. The secondary seal is accomplished with a compressed O-rings made of NBR material. Compression and subsequent sealing shall preclude specific torque requirements. The system shall also include a tertiary seal to prevent leakage into the motor housing due to capillary action through the insulation if the cable is damaged or cut. The cable wires shall be cut, stripped, re- connected with a copper butt end connector, and embedded in epoxy within the cable gland. This provides a dead end for leakage through the cable insulation into the motor junction area. The cable entry system shall be the same for both the power and control cables. Cable entrance design that do not prevent moisture from entering the junction area through capillary action or those that utilize silicones, or alternative caulking materials shall be considered unacceptable.
- J. The watertight integrity of the motor housing and shaft seal shall be tested during manufacture.
- 2.07 AUTOMATIC QUICK DISCHARGE CONNECTION
- A. Each pump shall be furnished with a submersible discharge connection system to permit removal and installation of the pump without the necessity of an operator entering the wet well. The design must insure an automatic and firm connection of the pump to the discharge piping when lowered into place. The connection shall be metal- to-metal without the use of gaskets, O-rings, or grommets.
- B. The QDC shall be ASTM A48, Class 30 iron with integral guide rail pilots and shall be provided with all hardware and anchor bolts required for permanent installation to the wet well floor. The base plate shall be

designed with an integral 900 elbow for connection to the vertical discharge piping utilizing standard ANSI 125 lbs. flanges. The base plate shall be coated with an epoxy coating for corrosion resistance. The manufacturer shall provide all necessary drawings to insure proper installation and alignment of baseplate within the wet well.

- C. Each pump shall be provided with a replaceable ASTM A48, Class 30 iron slide guide attached to pump discharge flange. The connection between the slide guide and the base shall be through metal-to-metal contact. Systems that require the use of gaskets, O-rings, or grommets shall not be acceptable.
- D. The contractor shall provide two lengths of Schedule 40 304L stainless steel guide rail pipes for each pump. Guide rails shall be unspliced (unless the wet well depth exceeds twenty feet – refer to Section 2.05.D above), and rail size (diameter) shall be as specified by the pump manufacturer.
- E. Upper (and intermediate, if required) guide rail brackets, and a lifting cable or chain shall be furnished for each pump. Guide rails shall be plumb, attached to the pump base (QDC) at the bottom and the guide rail brackets above.
- F. The slide guide shall direct the pump down two vertical guide rails and onto the discharge connection in a simple lineal movement. The slide guide shall be designed to transmit full weight of the pump to the base (QDC) flange. No portion of the pump shall rest directly on the bottom of the wet well or be supported by the guide rails, or lifting cable (chain). The presence of sludge and grease on guide rails shall not present problems during the lifting operation.
- G. Lifting cable or chain shall be 304 SS and shall be permanently attached to the lifting bail of each pump. Excess length necessary to utilize the hoist specified shall be secured to the upper guide rail bracket in the wet well. If lifting cable is provided, a crimped ball end shall be provided at the upper end of each cable for attaching to the lifting hoist drum.
- H. All bolts, machine screws, nuts, washers, and lock washers for complete assembly of access cover, guide rail assembly, discharge elbow (QDC), and discharge piping shall be stainless steel.

## 2.08 WET WELL ACCESS

- A. The wet well access cover shall be fabricated from welded aluminum sections. A hinged aluminum door shall be provided for each pump. The hinged door shall be fabricated from 1/4" thick aluminum with non-skid diamond tread on upper surface. All hardware on access assembly shall be stainless steel with a flush upper surface without protrusions. For safety, the door shall have a 300psf rating and be fitted with a recessed staple for padlock. Door shall be furnished with a flush aluminum drop handle and automatic hold open arm.
- B. A safety grate shall be provided to protect personnel from falling into the wet well when the access doors are open. The fall through protection system shall be a grate consisting of two leafs made of 6061-T6 aluminum hinged on the same side of the hatch. The grate system shall provide continuous safety assurance in both its closed and open positions. When closed, the grate shall allow visibility for inspections and performance of limited maintenance below it. When open, the grate shall act as an additional barrier to the access door opening. The grate shall be designed to withstand a minimum pedestrian load of 300 lbs. per square foot. The grate openings shall be 4" x 6" to allow both visual inspection and limited access for maintenance purposes when the grate is closed. Each leaf of the grate will pivot on aluminum hinge devices with 316 SS hardware that shall permit them to rotate upward 90 degrees and automatically lock in place. Aluminum pull rods will be attached to each grate leaf so the operator is positioned with the grate between him and the hatch's opening whenever he raises a leaf. Each grate leaf will have a rod made from 316 SS that automatically engages to secure the leaf in its open position, and can be lifted upward to permit the grate leaf to close. The hatch cover will not be able to shut until the grate is closed – thereby ensuring the grate is in position when the next operator opens the hatch cover. The grate shall have an OSHA safety

orange finish to increase visual awareness of the safety hazard. All hardware components shall be 316 SS to withstand corrosive wastewater environments.

2.09 VALVES AND PIPING

- A. Each pump shall be equipped with a full flow type check valve capable of passing a 3" spherical solid. Valve shall be constructed with ANSI flanged ends and fitted with a weighted external lever. Valve seat shall be constructed of stainless steel, secured to the body to ensure concentricity, sealed by an O-ring, and shall be replaceable. The valve body shall be cast iron incorporating a clean-out port large enough to allow removal and/or replacement of the valve clapper without removing valve or piping from the line. Valve clapper shall have a molded neoprene seating surface incorporating low pressure sealing rings. Valve hinge pin and internal hinge arm shall be stainless steel supported on each end in brass bushings. Shaft nut shall have double O-rings which shall be easily replaceable without requiring access to interior of valve body. All internal hardware shall be stainless steel. Valve shall be rated at 175 PSI working pressure, 350 PSI hydrostatic test pressure. Valves other than full flow type or valves mounted in such a manner that prevents the passage of a 3" spherical solid shall not be acceptable. Check valves shall be a regular production item that are commercially available from a variety of sources. Specially-constructed check valves available only from the station manufacturer are not acceptable.
- B. Each discharge line shall be equipped with a 2-way plug valve to permit isolation of the pumps from the common discharge header. The plug valve shall be non-lubricated type. Valve body shall be cast iron with flanged end connections drilled to ANSI 125- pound standard. Valve shall be furnished with a drip-tight shutoff plug mounted in stainless steel bearings, and shall have a resilient facing bonded to the sealing surface. Valves shall have ports designed to pass 3" spherical solids.
- C. Flanged header pipe shall be centrifugally cast, ductile iron, complying with ANSI/AWWA A21.51/C115 and Class 53 thickness. Flanges shall be cast iron Class 125, and shall comply with ANSI B16.1. Pipe and flanges shall be threaded and suitable thread sealant applied before assembling flange to pipe. Bolt holes shall be in angular alignment within 1/2° between flanges. Flanges shall be faced and a gasket finish applied. All pipes connected to the pump station shall be supported according to good commercial practice.
- D. The station shall be provided with an integral discharge bypass piping arrangement to allow the operator to connect an external emergency pump in the event of a power and/or station failure. The station header pipe shall incorporate a 2-way plug valve to permit emergency access to the pump station force main after isolation of the pumps. The plug valve shall be non-lubricated, tapered type. Valve body shall be cast iron with flanged end connections drilled to 125-pound standard. Valve shall be furnished with a drip-tight shutoff plug mounted in stainless steel bearings, and shall have a resilient facing bonded to the sealing surface. The header pipe shall penetrate the station sidewall and terminate with a male OPW type quick connect fitting.
- E. Pressure gauges shall be isolated from the wastewater by isolator rings to assure accurate, repeatable pressure readings without compromising gauge function. The isolator ring shall incorporate a flexible rubber (Viton®) sleeve designed to measure line pressure throughout the full 360° circumference of the pipe inner diameter. The inside diameter of the isolator ring shall match the pipe ID to assure a smooth, unobstructed flow, self-cleaning operation, and minimize turbulence and friction. The isolator ring shall be carbon steel. End plates shall be Acetal Homo Polymer. The elastomeric sleeve shall be Viton®. Isolator rings shall fit inside the bolt circle of 125# ANSI flanges. Face to face length of the isolator ring shall conform to specification MSS-SP67. The center section shall have a cavity behind the rubber sleeve filled with a high viscosity food grade silicone fluid to transfer pressure to the gauge. The isolator system shall dampen out surges or pressure spikes and eliminate gauge fluctuations without the need for a separate snubber. The isolator ring shall be vacuum filled and permanently sealed at the factory using a high viscosity food grade silicone fluid with a modular seal consisting of a rubber membrane and needle fitting to allow removal and replacement of pressure instruments without compromising the vacuum fill. The needle fitting shall have both 1/4" NPT(F) thread and 1/2 NPT(M) threads. The pressure isolator shall be capable of operating under pressure with all instruments removed with no loss of fill fluid, without isolating

valves. Pressure instruments shall be attached to the isolator with a hand tightened lock ring. Max operating pressure without leakage 1,000 psi. In addition, all gauges and/or instrumentation shall be prefilled at the factory with high viscosity food grade silicone fluid and supplied with a fitting that shall allow them to be installed and/or replaced in the field without the need for vacuum filling. The system shall be designed to allow field replacement of gauges without service interruption or process spills. No isolation valves shall be required. No tools shall be required to change pressure gauges and/or instruments. Isolator rings with a fill plugs that can be removed with the resultant loss of fluid shall not be acceptable. Standard tapped single point connections or diaphragm seals vulnerable to plugging by debris or deposits shall not be acceptable.

2.10 SUPPORTS AND THRUST BLOCKS

- A. All piping connected to the pump station shall be supported in accordance with good commercial practice. The control panel, control power transformer, and discharge pressure gauge shall be mounted on a supporting framework of fabricated steel. The support frame shall be drilled to accept all equipment, and shall be constructed entirely of fabricated steel angle shapes.

2.11 FINISH

- A. All above ground station piping, control panel, and exposed steel framework shall be cleaned with industrial grade chemical cleaner. The prime coat shall be zinc-based synthetic primer. The finish coat shall be a High Performance Protective Enamel coating.

2.12 ELECTRICAL CONTROL COMPONENTS

- A. The pump station control panel shall be tested as an integral unit by the pump station manufacturer.
- B. The electrical control equipment shall be mounted within a NEMA 4X, TYPE 1 stainless steel enclosure with 3-point latch. The enclosure door shall be hinged and sealed with a neoprene gasket. It shall include a removable plated steel back panel on which control components shall be mounted. Back panel shall be secured to enclosure with collar studs. Operator controls shall be mounted on a hinged inner door of aluminum or stainless steel. The control enclosure shall be mounted within the fiberglass valve enclosure. The control panel shall be equipped with vapor emission type corrosion inhibitors.
- C. All control components shall be securely fastened to a removable back panel with screws and lock washers. Switches, indicators and instruments shall be mounted through the control panel door. All control devices and instruments shall be secured to the sub-plate with machine screws and lock washers. Mounting holes shall be drilled/tapped, and self-tapping screws shall not be used to mount any components. All connections from the back panel to door mounted or remote devices shall be made through terminal blocks. All control devices shall be clearly labeled to indicate function.
- D. A main terminal block and ground bar shall be furnished for field connection of the electrical supply. The connections shall be designed to accept copper conductors of sufficient size to serve the pump station loads. The main terminal block shall be mounted to allow incoming wire bending space in accordance with Article 373 of the National Electrical Code (NEC).
- E. Pump station controls shall conform to third party safety certification. The finished control panel shall bear a serialized UL label listed for "Enclosed Industrial Control Panels". The enclosure, and all components mounted on the sub-panel or control cover, shall conform to UL descriptions and procedures.
- F. The control panel shall be equipped with a transient voltage surge suppressor to minimize damage to the pump motors and control from transient voltage surges. The suppressor shall utilize thermally protected silicon-oxide varistors encapsulated in a non-conductive housing. Mechanical indicators shall be provided on each phase to indicate protection has been lost.
- G. Motor Branch Components

1. A properly sized heavy duty air circuit breaker shall be furnished for each pump motor, and shall have a symmetrical RMS interrupting rating of 18,000 amperes at 460 volts, 25,000 amperes at 230 volts. All circuit breakers shall be sealed by the manufacturer after calibration to prevent tampering.
  2. A padlocking operating mechanism shall be installed on each motor circuit breaker. Operator handles for the mechanisms shall be located on the door, with interlocks which permit the door to be opened only when circuit breakers are in the "OFF" position. An additional mechanism(s) shall be provided on the circuit breaker permitting the breaker to be operated and/or locked with the control panel door in the open position.
  3. An open frame, across-the-line, NEMA rated magnetic motor starter with Solid State Adjustable Overloads shall be furnished for each pump motor. Starters shall be designed for addition of at least two auxiliary contacts. Power contacts shall be double-break and made of cadmium oxide silver. Coils shall be epoxy molded for protection from moisture and corrosive atmospheres. The starter assembly shall be equipped with a metal mounting plate for durability. All motor starters shall be equipped to provide under-voltage release and overload protection on all three phases. Motor starter contacts and coils shall be easily replaceable without removing the motor starter from its mounted position.
    - a. Overload relays shall be solid-state block type, having visual trip indication with trip-free operation. Electrically resetting the overload will cause one (1) normally open and one (1) normally closed isolated alarm/control contact to reset, thus re-establishing a control circuit. Trip setting shall be governed by solid-state circuitry and adjustable current setting. Trip classes shall be 10, 15 and 20. Additional features to include phase loss protection, selectable jam/stall protection and selectable ground fault protection.
    - b. An overload reset pushbutton, mounted through the control panel door, shall permit resetting the overload relays without opening the door.
  4. All motor branch and power circuit components shall be of highest industrial quality. The short circuit current rating of all power circuit devices shall be a tested combination or evaluated per the National Electrical Code Article 409. The lowest rated power circuit component shall be the overall control panel short circuit rating and shall not be less than the fault current available. The minimum control panel rating shall not be less than 10 kA, RMS symmetrical. Control assemblies operating at 120 volts nominal or less may be provided with transformers which limit the fault current and may be rated less than the minimum required short circuit rating.
- H. Oil-tight pilot lights for each pump motor shall be provided. Each light shall be wired in parallel with the related pump motor starter to indicate that the motor is on or should be running. Pilot lights shall be in addition to any lights provided as a part of automatic level controller that may be specified herein. All pilot lights shall be suitable for 120VAC, and shall be mounted in keyed openings on the inner door of the control panel. Pilot lights shall be push-to-test, shall utilize LED lamps and shall be provided with jeweled glass or plastic lenses a minimum of 1" in diameter. A common push-to- test button for verifying the condition of pilot light lamps shall also be acceptable.
- I. Individual pilot lights shall be provided to alert maintenance personnel to a "high temperature" or "seal leak" alarm condition for each pump and the pump control panel shall be equipped to terminate pump operation due to high motor winding temperature or moisture in the motor housing, utilizing contacts in the pump motor housing. As noted above pilot lights shall be in addition to any lights provided as a part of automatic level controller that may be specified herein. All pilot lights shall be suitable for 120VAC, and shall be mounted in keyed openings on the door of the control panel. Pilot lights shall be push-to-test, shall utilize LED lamps and shall be provided with jeweled glass or plastic lenses a minimum of 1" in diameter. A common push-to-test button for verifying the condition of pilot light lamps shall also be acceptable. Dry contacts, wired to terminal blocks, shall be furnished for each pump for thermal and moisture shutdown.
- J. The control circuit shall be protected by a normal duty thermal-magnetic air circuit breaker which shall be connected in such a manner as to allow control power to be disconnected from all control circuits.

- K. Pump mode selector switches shall be connected to permit manual start and manual stop for each pump individually, and to select automatic operation of each pump under control of the liquid level control system. Manual operation shall override the liquid level control system. Selector switches shall be heavy duty, oil-tight design, with contacts rated NEMA A300 minimum.
- L. Pump alternation shall be integral to the liquid level controller when submersible transducer level controls are used. Provisions for automatic alternation or manual selection shall also be integral to the liquid level controller. A lag pump start delay timer shall be provided to prevent simultaneous starting of pumps after power failure or if both pumps are called for by the liquid level control system.
- M. Six-digit elapsed time indicators (non-reset type) shall be connected to each motor starter to indicate the total running time of each pump in "hours" and "tenth of hours".
- N. Dry (non-powered) contacts shall be provided to the terminal strip for connection to existing or future SCADA equipment that is not required under this contract. Contacts provided shall include for each pump to indicate "pump on", "pump off", "pump high temp", and "pump moisture alarm". Dry contacts for "high wet well level" shall also be provided. Monitoring contacts shall be provided for each pump located in the wet well. All contacts shall be Form B design, capable of carrying a minimum of 10 amps at 120VAC. Contact closures shall be separately wired with two separate leads in the panel, and with no common wiring between functions.
- O. A duplex ground fault indicating utility receptacle providing 115 VAC, 60 Hertz, single phase current, shall be mounted on the side of the control enclosure. Receptacle circuit shall be protected by a 20 ampere thermal-magnetic circuit breaker.
- P. The lift station shall be equipped with NEMA 3R enclosed 5 KVA control transformer to supply 115 volts, AC, single phase for the control and auxiliary equipment. The primary and secondary side of the transformer is to be protected by a thermal magnetic circuit breaker sized to meet the power requirements of the transformer.
- Q. The control panel shall be equipped to monitor the incoming power and shut down the pump when required to protect the motor(s) from damage caused by voltage less than 83% of nominal. The motor(s) shall automatically restart when power conditions return to normal.
- R. The control panel, as furnished by the manufacturer, shall be completely wired. The contractor shall field connect the power feeder lines to the main terminal block, final connections to the remote alarm devices, and the connections between the pump and the pump motor control. All wiring, workmanship, and schematic wiring diagrams shall be in compliance with applicable standards and specifications set forth by the National Electric Code (NEC). All user serviceable wiring shall be type MTW or THW, 600 volts, and shall be color coded as follows:
- |    |   |        |
|----|---|--------|
| 1. | Line and load circuits, AC or DC power          | Black  |
| 2. | AC control circuit less than line voltage       | Red    |
| 3. | DC control circuit                              | Blue   |
| 4. | Interlock control circuit, from external source | Yellow |
| 5. | Equipment grounding conductor                   | Green  |
| 6. | Current carrying ground                         | White  |
| 7. | Hot with circuit breaker open                   | Orange |
- S. Control circuit wiring inside the panel, with the exception of internal wiring of individual components, shall be 16-gauge minimum, type MTW or THW, 600 volts. Power wiring shall be 14-gauge minimum. Motor branch and other power conductors shall not be loaded above the temperature rating of the connected termination. Wires shall be clearly numbered at each end in accordance with the electrical diagrams. All wires on the sub-plate shall be bundled and tied.

- T. Wires connected to components mounted on the enclosure door shall be bundled and tied in accordance with good commercial practice. Bundles shall be made flexible at the hinged side of the enclosure. Adequate length and flex shall be provided to allow the door to swing to its full open position without undue stress or abrasion on the wire or insulation. Bundles shall be held in place on each side of the hinge by mechanical fastening devices.
- U. All conduit and fittings shall be UL listed. Liquid tight flexible metal conduit shall be constructed of smooth, flexible galvanized steel core with smooth abrasion resistant, liquid tight, polyvinyl chloride cover. Conduit shall be supported in accordance with articles 346, 347, and 350 of the National Electric Code. Conduit shall be sized according to the National Electric Code.
- V. The pump control manufacturer shall provide a common ground bar mounted on the enclosure back plate. The mounting surface of the ground bar shall have any paint removed before making final connections. The contractor shall make the field connections to the main ground lug and each pump motor in accordance with the National Electric Code.
- W. A permanent corrosion resistant name plate(s) shall be attached to the control and include the following information:
  - 1. Equipment serial number
  - 2. Control panel short circuit rating
  - 3. Supply voltage, phase and frequency
  - 4. Current rating of the minimum main conductor
  - 5. Electrical wiring diagram number
  - 6. Motor horsepower and full load current
  - 7. Motor overload heater element
  - 8. Motor circuit breaker trip current rating
  - 9. Name and location of equipment manufacturer
- X. Control components shall be permanently marked using the same identification shown on the electrical diagram. Identification label shall be mounted adjacent to the device. Switches, indicators, and instruments shall be plainly marked to indicate function, position, etc. Marking shall be mounted adjacent to and above the device.

#### 2.13 LIQUID LEVEL CONTROL

- A. The manufacturer of the liquid level control system must be ISO 9001:2000 revision certified, with scope of registration including design control and service after sales activities.
- B. The level control system shall start and stop the pump motors in response to changes in wet well level, as set forth herein.
- C. The level control system shall operate as a float switch system, as specified below. The level control system shall utilize automatic alternation to select first one pump, then the second pump to run as lead pump for a pumping cycle. Alternation shall occur at the end of a pumping cycle.
- D. Upon operator selection of automatic operation, a float switch shall start one pump motor when water rises to the "lead pump start level". When the water is lowered to the "pump stop level", the system shall stop this pump. These actions shall constitute one pumping cycle. Should the water continue to rise, an additional float switch will start the second pump after reaching the "lag pump start level" so that both pumps operate together. Both pumps shall stop at the same "all pumps off level". Circuit design in which the application of power to the lag pump motor starter is contingent upon completion of the lead pump circuit shall not be acceptable.
  - 1. The level control system shall work in conjunction with an external alternator relay to select first one pump, then the second pump, to run as "Lead" pump. Alternation will occur at the end of each pumping cycle.

2. Float switches shall be provided by the pump station manufacturer for field installation in the wet well by the contractor, each with adequate cable to reach the control panel without splicing. Switches shall be the direct-acting type, designed and constructed for extremely long life in severe applications. Each float switch shall contain a single pole mercury switch in the normally open position, which shall close when the switch body is tilted. Switches shall be epoxy encapsulated, and the level sensors shall be impact and corrosion resistant.
  3. A separate float switch and relay shall be provided to alert maintenance personnel to a high water level in the wet well. Should the water level rise to the "high water alarm" level, the float switch and relay shall energize a 115-volt AC circuit for an external alarm device. An electrical or mechanical indicator, visible from front of control panel, shall indicate high level condition exists. The alarm signal shall be maintained until wet well level is lowered and alarm circuit has been manually reset.
  4. A separate float switch shall be used to alert maintenance personnel to a low liquid level in the wet well. An indicator, visible on the front of the control panel, shall indicate that a low wet well level exists. The alarm signal shall be maintained until the cause of the low wet well level has been corrected and the circuit has been manually reset. A low liquid level condition shall disable both pump motors. When the wet well rises above the low-level point, both pump motors shall be automatically enabled. The low water alarm shall be furnished with SPDT dry contacts.
  5. Float switch housings shall be 316 stainless steel, with a Teflon coating to reduce the buildup of grease and other materials. #14/3 AWG Hypalon-jacketed Type SO cable shall be provided with each float switch, of the length as noted above. Cable shall have a minimum of 105 strands of copper in each conductor for maximum flexibility. A green ground wire shall also be included in the cable for each float switch, and shall be connected to the ground terminals in the pump control panel. Float switch contacts shall be rated for 20 amps @ 120VAC.
- E. The modular float switch controller shall be a Model PC-2000 as manufactured by Primex Controls, Inc. One spare modular controller shall be provided as a spare part by the station manufacturer.
- F. Each float switch shall be provided with the necessary hardware to be securely mounted on a 1/8" diameter 316 stainless steel mounting cable. A suitable weight kit shall be attached to the bottom of the float switch suspension cable to secure both the cable and the float in the wet well, and to prevent excessive movement. The float switch connection hardware shall be adjustable to allow repositioning in the wet well as required. The entire float assembly (weight, support cable, and all switches) shall be easily removed from the wet well for inspection, cleaning, or adjustment as required. Mounting hardware shall be included for installation of the float switches on the support cable assembly.
1. Float switches shall be Model W40NO-SST, manufactured by Anchor Scientific, Inc. A suitable support bracket shall be provided with the wet well access cover, for securing the switch support cable to the top of the wet well. The bracket shall be fabricated of 304 stainless steel.
- G. An alarm silence pushbutton and relay shall be provided to permit maintenance personnel to de-energize the audible alarm device while corrective actions are underway. After silencing the alarm device, manual reset of the alarm condition shall clear the alarm silence relay automatically. The pushbutton shall be oil tight design with contacts rated NEMA A300 minimum.
- H. The station manufacturer will supply a 115VAC alarm light fixture with a vapor-tight red globe, guard, conduit box, and mounting base. The design must prevent rain water from collecting in the gasketed area of the fixture, between the base and globe. The alarm light will be shipped loose, for installation by the contractor.
- I. The alarm light circuit shall be equipped with a flasher causing the alarm light to flash. Flash rate shall be approximately 1 second. (½ second on and off).

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Contractor shall off-load equipment at installation site using equipment of sufficient size and design to prevent injury or damage. Station manufacturer shall provide written instruction for proper handling. Immediately after off-loading, contractor shall inspect complete pump station and appurtenances for shipping damage or missing parts. Any damage or discrepancy shall be noted in written claim with shipper prior to accepting delivery. Validate all station serial numbers and parts lists with shipping documentation. Notify the manufacturer's representative of any unacceptable conditions noted with shipper.

#### 3.02 INSTALLATION

- A. The contractor shall install, level, align, and lubricate all equipment associated with the pump station as shown indicated on the project drawings, and as outlined in the O&M manual provided with the equipment. Installation must be in accordance with written instructions supplied by the manufacturer at time of delivery.
- B. Check motor and control data plates for compatibility to site voltage. Install and test the station ground prior to connecting line voltage to station control panel.
- C. Prior to applying electrical power to any motors or control equipment, check all wiring for tight connection. Verify that all protective devices (fuses and circuit breakers) conform to project design documents. Manually operate circuit breakers and switches to ensure operation without binding. Open all circuit breakers and disconnects before connecting utility power. Verify line voltage, phase sequence and ground before actual start-up.

#### 3.03 FIELD QUALITY CONTROL

- A. Operational Test
  - 1. Prior to acceptance by owner, an operational test of all pumps, and control systems shall be conducted to verify that the installed equipment meets the purpose and intent of these specifications. Tests shall demonstrate that all equipment provided is electrically, mechanically, structurally, and otherwise acceptable; that it is safe and in optimum working condition; and that it conforms to the specified operating characteristics.
  - 2. After construction debris and foreign material has been removed from the wet well, contractor shall supply clear water volume adequate to operate station through several pumping cycles. Observe and record operation of pumps, discharge gauge readings, ampere draw, pump controls, and liquid level controls. Check calibration of all instrumentation equipment, test manual control devices, and automatic control systems. Be alert to any undue noise, vibration or other operational problems.
- B. Manufacturer's Start-up Services
  - 1. Coordinate station start-up with the manufacturer's technical representative. The representative or factory service technician will inspect the completed installation, calibrate and adjust instrumentation, correct or supervise correction of defects or malfunctions, and instruct operating personnel in proper operation and maintenance procedures. The pump station warranty is contingent on receipt of a complete start-up report in accordance with specification Section 1.08.E.

#### 3.04 CLEANING

- A. Prior to acceptance, inspect interior and exterior of pump station for dirt, splashed material or damaged paint. Clean or repair accordingly. Remove from the job site all tools, surplus materials, scrap and debris.

3.05 PROTECTION

- A. The pump station should be placed into service immediately upon completion of field startup. If operation is delayed, the station shall be stored and maintained per the manufacturer's written instructions until it is ready for use.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Extent of storm sewer collection system work is shown on drawings. Storm Sewer collection system work includes, but is not limited to, the following:
1. Pipe and fittings.
  2. Non-pressure transition couplings.
  3. Cleanouts.
  4. Drains.
  5. Manholes.
  6. Channel drainage systems.
  7. Catch basins.
  8. Stormwater inlets.
  9. Pipe outlets.

1.02 RELATED SECTIONS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 01 Specification Sections.

1.03 QUALITY ASSURANCE

- A. Installer: A firm specializing and experienced in sewer collection system work for not less than two (2) years.
- B. Comply with the requirements of applicable Division 31 sections for excavation and backfilling required in connection with exterior water service piping.

1.04 REFERENCES

- A. ACI – American Concrete Institute:
1. ACI 318 – Building Code Requirements and Commentary.
- B. ACPA – American Concrete Pipe Association:
1. Concrete Pipe Installation Manual.
- C. ASME – American Society of Mechanical Engineers
1. ASME A112.36.2M – Cleanouts.
  2. ASME A112.6.3 – Floor and Trench Drains.
- D. ASTM International:
1. ASTM A48 - Standard Specification for Gray Iron Castings.
  2. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.
  3. ASTM A536 - Standard Specification for Ductile Iron Castings.
  4. ASTM A674 - Standard Practice for Polyethylene Encasement for Ductile Iron Pipe.
  5. ASTM A760 – Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains.
  6. ASTM A798 - Standard Practice for Installing Factory-Made Corrugated Steel Pipe for Sewers and Other Applications.
  7. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
  8. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
  9. ASTM C478 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections.
  10. ASTM C564 – Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

11. ASTM C891 - Standard Practice for Installation of Underground Precast Concrete Utility Structures.
  12. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
  13. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
  14. ASTM C1173 - Standard Specification for Flexible Transition Couplings for Underground Piping Systems.
  15. ASTM C1460 - Standard Specification for Shielded Transition Couplings for Use with Dissimilar DWV Pipe and Fittings Above Ground.
  16. ASTM C1479 - Standard Practice for Installation of Precast Concrete Sewer, Storm Drain, and Culvert Pipe Using Standard Installations.
  17. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
  18. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
  19. ASTM D5926 - Standard Specification for Poly (Vinyl Chloride) (PVC) Gaskets for Drain, Waste, and Vent (DWV), Sewer, Sanitary, and Storm Plumbing Systems.
  20. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
  21. ASTM F1668 - Standard Guide for Construction Procedures for Buried Plastic Pipe.
- E. AWWA - American Water Works Association:
1. AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
- F. CISPI - Cast Iron Soil Pipe Institute:
1. Cast Iron Soil Pipe and Fittings Handbook.
- G. NSSGA - National Stone Sand & Gravel Association:
1. Quarried Stone for Erosion and Sediment Control.
- 1.05 SUBMITTALS
- A. Product Data: For each type of product indicated.
- B. Shop Drawings:
1. Manholes: Include plans, elevations, sections, details, frames, and covers.
  2. Catch basins and stormwater inlets. Include plans, elevations, sections, details, frames, covers, and grates.
- 1.06 DELIVERY, STORAGE, AND HANDLING
- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.
- D. Handle catch basins and stormwater inlets according to manufacturer's written rigging instructions.
- 1.07 PROJECT CONDITIONS
- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
1. Notify Architect no fewer than two days in advance of proposed interruption of service.
  2. Do not proceed with interruption of service without Architect's written permission.

## PART 2 PRODUCTS

### 2.01 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A74, Service class.
- B. Gaskets: ASTM C564, rubber.

### 2.02 STEEL PIPE AND FITTINGS

- A. Corrugated-Steel Pipe and Fittings: ASTM A760/A760M, Type I with fittings of similar form and construction as pipe.
  - 1. Standard-Joint Bands: Corrugated steel.
  - 2. Coating: Zinc.

### 2.03 PVC PIPE AND FITTINGS

- A. PVC Type PSM Sewer Piping:
  - 1. Pipe: ASTM D3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
  - 2. Fittings: ASTM D3034, PVC with bell ends.
  - 3. Gaskets: ASTM F477, elastomeric seals.

### 2.04 CONCRETE PIPE AND FITTINGS

- A. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C76.
  - 1. Tongue-and-groove ends and gasketed joints with ASTM C443
  - 2. Class III.

### 2.05 NONPRESSURE TRANSITION COUPLINGS

- A. Comply with ASTM C1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground non-pressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Sleeve Materials:
  - 1. For Dissimilar Pipes: ASTM D5926, PVC or other material compatible with pipe materials being joined.
- C. Unshielded, Flexible Couplings:
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Dallas Specialty & Mfg. Co.
    - b. Fernco Inc.
    - c. Logan Clay Pipe.
    - d. Mission Rubber Company; a division of MCP Industries, Inc.
  - 2. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
- D. Shielded, Flexible Couplings:
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Cascade Waterworks Mfg.
    - b. Dallas Specialty & Mfg. Co.
    - c. Mission Rubber Company; a division of MCP Industries, Inc.
  - 2. Description: ASTM C1460, elastomeric or rubber sleeve with full-length, corrosion-resistant-metal outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

- E. Ring-Type, Flexible Couplings:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Fernco Inc.
    - b. Logan Clay Pipe.
    - c. Mission Rubber Company; a division of MCP Industries, Inc.
  2. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

## 2.06 CLEANOUTS

- A. Cast-Iron Cleanouts:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Josam Company.
    - b. MIFAB, Inc.
    - c. Smith, Jay R. Mfg. Co.
    - d. Tyler Pipe.
    - e. Watts Water Technologies, Inc.
    - f. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
  2. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
  3. Top-Loading Classification: Heavy Duty.
  4. Sewer Pipe Fitting and Riser to Cleanout: ASTM A74, Service class, cast-iron soil pipe and fittings.
- B. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

## 2.07 DRAINS

- A. Cast-Iron Area Drains:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Josam Company.
    - b. MIFAB, Inc.
    - c. Smith, Jay R. Mfg. Co.
    - d. Tyler Pipe.
    - e. Watts Water Technologies, Inc.
    - f. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
  2. Description: ASME A112.6.3 gray-iron round body with anchor flange and round grate. Include bottom outlet with inside calk or spigot connection, of sizes indicated.
  3. Top-Loading Classification(s): Heavy Duty.
- B. Cast-Iron Trench Drains:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Josam Company.
    - b. MIFAB, Inc.
    - c. Smith, Jay R. Mfg. Co.
    - d. Tyler Pipe.
    - e. Watts Water Technologies, Inc.
    - f. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
  2. Description: ASME A112.6.3, 6-inch wide top surface, rectangular body with anchor flange or other anchoring device, and rectangular grate. Include units of total length indicated and quantity of bottom outlets with inside calk or spigot connections, of sizes indicated.

3. Top-Loading Classification(s): Heavy Duty.

## 2.08 MANHOLES

### A. Standard Precast Concrete Manholes:

1. Description: ASTM C478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Diameter: 48 inches minimum unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section as required to prevent flotation.
4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
5. Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated, and top of cone of size that matches grade rings.
7. Joint Sealant: ASTM C990, bitumen or butyl rubber.
8. Steps: Individual FRP steps wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches.
9. Grade Rings: Reinforced-concrete rings, 6-inch total thickness, to match diameter of manhole frame and cover, and height as required to adjust manhole frame and cover to indicated elevation and slope.

### B. Manhole Frames and Covers:

1. Description: Ferrous; 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange and 26-inch diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
2. Material: ASTM A536, Grade 60-40-18 ductile or ASTM A48/A48M, Class 35 gray iron unless otherwise indicated.

## 2.09 POLYMER-CONCRETE, CHANNEL DRAINAGE SYSTEMS

- A. General Requirements for Polymer-Concrete, Channel Drainage Systems: Modular system of precast, polymer-concrete channel sections, grates, and appurtenances; designed so grates fit into channel recesses without rocking or rattling. Include quantity of units required to form total lengths indicated.

- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ABT, Inc.
2. ACO USA.
3. Innovative Plastic, Inc.; a subsidiary of T-H Marine Supplies, Inc.
4. Mea-Josam Div.; Josam Company.
5. Poly-Cast.

### C. Sloped-Invert, Polymer-Concrete Systems:

1. Channel Sections:
  - a. Interlocking-joint, precast, modular units with end caps.
  - b. 4-inch inside width and deep, rounded bottom, with built-in invert slope of 0.6 percent and with outlets in quantities, sizes, and locations indicated.
  - c. Extension sections necessary for required depth.
  - d. Frame: Include gray-iron or steel frame for grate.
2. Grates:
  - a. Manufacturer's designation "ADA Heavy Duty," with slots or perforations that fit recesses in channels.
  - b. Material: Stainless steel.
3. Covers: Solid gray iron if indicated.
4. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.

- D. Drainage Specialties: Precast, polymer-concrete units.
  - 1. Large Catch Basins:
    - a. 24-by-12-inch polymer-concrete body, with outlets in quantities and sizes indicated.
    - b. Gray-iron slotted grate.
    - c. Frame: Include gray-iron or steel frame for grate.
  - 2. Small Catch Basins:
    - a. 19- to 24-inch by approximately 6-inch polymer-concrete body, with outlets in quantities and sizes indicated.
    - b. Gray-iron slotted grate.
    - c. Frame: Include gray-iron or steel frame for grate.
  - 3. Sediment Interceptors:
    - a. 27-inch square, polymer-concrete body, with outlets in quantities and sizes indicated.
    - b. 24-inch square, gray-iron frame and slotted grate.
- E. Supports, Anchors, and Setting Devices: Manufacturer's standard unless otherwise indicated.
- F. Channel-Section Joining and Fastening Materials: As recommended by system manufacturer.

## 2.10 CATCH BASINS

- A. Standard Precast Concrete Catch Basins:
  - 1. Description: ASTM C478 precast, reinforced concrete, of depth indicated, with provision for sealant joints.
  - 2. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
  - 3. Riser Sections: 4-inch minimum thickness, 48-inch diameter, and lengths to provide depth indicated.
  - 4. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
  - 5. Joint Sealant: ASTM C990, bitumen or butyl rubber.
  - 6. Grade Rings: Include two or three reinforced-concrete rings, of 6-inch total thickness, that match 24-inch diameter frame and grate.
  - 7. Steps: Individual FRP steps wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12-inch intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 60 inches.
  - 8. Pipe Connectors: ASTM C923 resilient, of size required, for each pipe connecting to base section.

## 2.11 STORMWATER INLETS

- A. Combination Inlets: Made with vertical curb and horizontal gutter openings, of materials and dimensions according to City standards. Include heavy-duty frames and grates.
- B. Frames and Grates: Heavy duty, according to City standards.

## 2.12 PIPE OUTLETS

- A. Head Walls: Cast-in-place reinforced concrete, with apron and tapered sides.
- B. Riprap Basins: Broken, irregularly sized and shaped, graded stone according to NSSGA's "Quarried Stone for Erosion and Sediment Control."
  - 1. Average Size: NSSGA No. R-5, screen opening 5 inches.
- C. Filter Stone: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. FS-2, No. 4 screen opening, average-size graded stone.

- D. Energy Dissipaters: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. A-1, 3-ton average weight armor stone, unless otherwise indicated.

### PART 3 EXECUTION

#### 3.01 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Section 31 20 00 - Earthwork.

#### 3.02 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- F. Install gravity-flow, non-pressure drainage piping according to the following:
1. Install piping pitched down in direction of flow.
  2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
  3. Install piping with 24-inch minimum cover.
  4. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
  5. Install corrugated steel piping according to ASTM A798/A798M.
  6. Install PVC sewer piping according to ASTM D2321 and ASTM F1668.
  7. Install reinforced-concrete sewer piping according to ASTM C1479 and ACPA's "Concrete Pipe Installation Manual."
- G. Install corrosion-protection piping encasement over the following underground metal piping according to ASTM A674 or AWWA C105:
1. Hub-and-spigot, cast-iron soil pipe and fittings.

#### 3.03 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, non-pressure drainage piping according to the following:
1. Join hub-and-spigot, cast-iron soil piping with gasketed joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
  2. Join corrugated steel sewer piping according to ASTM A798/A798M.
  3. Join PVC sewer piping according to ASTM D2321 and ASTM D3034 for elastomeric-seal joints or ASTM D3034 for elastomeric-gasketed joints.
  4. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
  5. Join dissimilar pipe materials with non-pressure-type flexible couplings.

3.04 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron, or PVC, soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
  - 1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
  - 2. Use Medium-Duty, top-loading classification cleanouts in asphalt or Portland cement concrete paved foot-traffic areas.
  - 3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
- B. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding earth grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.05 DRAIN INSTALLATION

- A. Install type of drains in locations indicated.
  - 1. Use Light-Duty, top-loading classification drains in earth or unpaved foot-traffic areas.
  - 2. Use Medium-Duty, top-loading classification drains in paved foot-traffic areas.
- B. Embed drains in 4-inch minimum concrete around bottom and sides.
- C. Fasten grates to drains if indicated.
- D. Set drain frames and covers with tops flush with pavement surface.
- E. Assemble trench sections with flanged joints.
- F. Embed trench sections in 4-inch minimum concrete around bottom and sides.

3.06 MANHOLE INSTALLATION

- A. General: Install manholes, complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C891.
- C. Where specific manhole construction is not indicated, follow manhole manufacturer's written instructions.
- D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.

3.07 CATCH BASIN INSTALLATION

- A. Construct catch basins to sizes and shapes indicated.
- B. Set frames and grates to elevations indicated.

3.08 STORMWATER INLET AND OUTLET INSTALLATION

- A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.
- B. Construct riprap of broken stone, as indicated.
- C. Install outlets that spill onto grade, anchored with concrete, where indicated.
- D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.
- E. Construct energy dissipaters at outlets, as indicated.

3.09 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

3.10 CHANNEL DRAINAGE SYSTEM INSTALLATION

- A. Install with top surfaces of components, except piping, flush with finished surface.
- B. Assemble channel sections to form slope down toward drain outlets. Use sealants, adhesives, fasteners, and other materials recommended by system manufacturer.
- C. Embed channel sections and drainage specialties in 4-inch minimum concrete around bottom and sides.
- D. Fasten grates to channel sections if indicated.
- E. Assemble channel sections with flanged or interlocking joints.
- F. Embed channel sections in 4-inch minimum concrete around bottom and sides.

3.11 CONNECTIONS

- A. Connect non-pressure, gravity-flow drainage piping in building's storm building drains specified on Plumbing drawings.
- B. Connect force-main piping to building's storm drainage force mains specified on Plumbing drawings. Terminate piping where indicated.
- C. Make connections to existing piping and underground manholes.
  - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
  - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
  - 3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
    - a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
    - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
  - 4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.
- D. Connect to sediment interceptors specified in on Plumbing drawings.
- E. Pipe couplings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
  - 1. Use non-pressure-type flexible couplings where required to join gravity-flow, non-pressure sewer piping unless otherwise indicated.
    - a. Shielded flexible couplings for same or minor difference OD pipes.
    - b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
    - c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.12 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
  - 1. Close open ends of piping with at least 8-inch thick, brick masonry bulkheads.
  - 2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Manholes and Structures: Excavate around manholes and structures as required and use one procedure below:
  - 1. Remove manhole or structure and close open ends of remaining piping.
  - 2. Remove top of manhole or structure down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
- C. Backfill to grade according to Section 31 20 00 - Earthwork.

3.13 IDENTIFICATION

- A. Materials and their installation are specified in Section 31 20 00 - Earthwork. Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
  - 1. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.14 CLEANING

- A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

END OF SECTION

