

Project Manual

Introductory Information, Contracting Requirements, and Technical Specifications

Johnson County Courthouse,

Second Level Courtroom Renovation

18.112

BID DOCUMENTS

September 23, 2022

Divisions 00 - 28

SECTION 00 0101

PROJECT TITLE PAGE

PROJECT MANUAL FOR

JOHNSON COUNTY COURTHOUSE - SECOND LEVEL COURTROOM RENOVATION

913 SOUTH DUBUQUE STEET

IOWA CITY, IOWA 52240

BIDDING DOCUMENTS

ISSUE DATE: SEPTEMBER 23, 2022

NM PROJECT NO: 18.112

AN IOWA STATE TAX EXEMPT PROJECT

THIS PROJECT MANUAL INCLUDES

PROCUREMENT REQUIREMENTS

CONTRACTING REQUIREMENTS

TECHNICAL SPECIFICATIONS

PREPARED BY

NEUMANN MONSON, INC.

221 East College Street, Suite 303

Iowa City, IA 52240

END OF PROJECT TITLE PAGE

SECTION 00 0103
PROJECT DIRECTORY

OWNER:

Johnson County Board of Supervisors
Johnson County Board of Supervisors Office
913 South Dubuque Street
Iowa City, Iowa 52240-4273
Contact: Ray Forsythe, Special Projects Manager
Office Phone: 319.688.5845

ARCHITECT:

NEUMANN MONSON, INC.
221 East College Street, Suite 303, Iowa City, IA 52240
Phone: 319.338.7878
Principal-in-Charge: Kim McDonald, AIA
Contact: Scott Palmberg, AIA
Email: spalmberg@neumannmonson.com

STRUCTURAL ENGINEER:

RAKER RHODES ENGINEERING, LLC
4717 Grand Avenue, Des Moines, IA 50312
Phone: 515.277.0275
Contact: Brad Hill
Email: bhill@rakerrhodes.com

MECHANICAL/ELECTRICAL/PLUMBING ENGINEER:

MODUS
118 East College Street, Suite 200, Iowa City, IA 52240
Phone: 319.248.4601
Fax: 319.248.0141
Contact: Trevor Conrad
Email: tconrad@modus-eng.com

END OF PROJECT DIRECTORY

SECTION 00 0107
SEALS PAGE

I hereby certify that the portion of this technical submission described herein was prepared by me or under my direct supervision and responsible charge. I am a duly Licensed Architect under the laws of the State of Iowa.

Kim S. McDonald , AIA

Signature

Date

Renewal Date: June 30, 2023 License No. 05215

Divisions covered by this seal: 00 thru 12, except as by noted others.

I hereby certify that this engineering document described herein was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Iowa.

Brad Hill, PE

Signature

Date

Renewal Date: December 31, 2022 License No.

Sections covered by this seal: 051200, 052100

I hereby certify that this engineering document described herein was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Iowa.

Trevor M. Conrad, PE

Signature

Date

Renewal Date: December 31, 2022 License No. 17602

Divisions covered by this seal: 22 thru 28

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ADVERTISEMENT FOR BIDS

OWNER: JOHNSON COUNTY, IOWA

PROJECT: JOHNSON COUNTY COURTHOUSE SECOND LEVEL COURTROOM RENOVATION

NOTICE TO POTENTIAL BIDDERS;

Notice is given hereby that Owner will receive sealed bids for construction of the above project until 2:00 p.m., local Time, on Thursday, October 20, 2022.

The Project is described in general as: floor replacement and construction of courtrooms, offices, and accessible restrooms. The Work includes selective demolition of architectural and mechanical / electrical items.

Offers shall be on a stipulated sum basis for a single General Construction Contract, including respective civil, mechanical, and electrical work; segregated bids will not be accepted.

Bid Security in the amount of five percent (5%) of the bid must accompany bid in accordance with the Instructions to Bidders.

Bids will be received at: Auditor's Office, Johnson County Administration Building, 913 South Dubuque Street, Iowa City, IA 52240.

Bids will be opened and publicly read aloud immediately after the specified closing time. Bids received after that time will not be accepted. All interested parties are invited to attend.

EXAMINATION OF PROCUREMENT DOCUMENTS:

As many as two (2) sets of printed Procurement Documents may be obtained by Bidders directly from DB Reprographics upon depositing the sum of \$50.00 (refundable) for each set of documents.

The deposit amount will be refunded within ten (10) calendar days following bid opening, provided complete sets of documents in satisfactory condition are returned, postpaid, to:

DB Reprographics, Inc., 1207 Highland Court, Iowa City, IA 52240; (319) 359-1069; Contact: David Burlingame; David@DBRepro.com; www.planroomdirect.com.

Electronic Procurement Documents may also be examined online at the DB Reprographics FTP & Online Planroom website: www.dbrepro.com. Any interested party must log-on and register under the project name. For any problems logging on to DBRepro.com you may call them directly at (319) 359-1069. Electronic Procurement Documents will also be available through the Master Builders of Iowa/Construction Update Network Online Plan Room: www.mbsonline.com

Printed sets of Procurement Documents may be examined at:

Neumann Monson Architects

221 East College Street, Suite 303, Iowa City, IA 52240

Owner: Johnson County Auditor's Office

913 South Dubuque Street, Iowa City, IA 52240.

OTHER REQUIREMENTS:

Products and materials incorporated in the Work of this Project are Exempt from Iowa sales tax and local option sales tax.

Performance Bond and Labor and Material Payment Bond will be required in the full amount of the contract.

Work required by the proposed Contract shall begin upon ISSUANCE OF THE OWNER'S "NOTICE TO PROCEED". The Work under this Contract shall have limited on-site access. Mobilization for Work on-site shall begin no earlier than Thursday, December 1, 2022 and be completed, with all equipment placed in operation, on or before the anticipated Substantial Completion Date of Saturday, July 1, 2023, subject to an extension of time which may be granted by the Owner.

The Owner reserves the right to reject any or all bids, to waive irregularity in the bids and in the bidding and to enter into such contract as shall be deemed to be in the Owners best interest.

SITE EXAMINATION:

Examine the project site before submitting a bid.

A visit to the project site has been arranged for bidders immediately following the Pre-Bid Conference.

PREBID CONFERENCE

A bidders conference has been scheduled for 8:30 a.m on Tuesday, October 11, 2022.

Attendees shall meet at the West Secure Building Entrance of the Johnson County Courthouse, 417 South Clinton Street, Iowa City, IA 52240, no later than 8:30 am. Attendees shall then be escorted to the work area for the actual pre-bid conference.

All general contract and subcontract bidders and suppliers are invited.

Representatives of the Owner and Design Professionals will be in attendance.

END OF ADVERTISEMENT FOR BID

SECTION 00 2113

INSTRUCTIONS TO BIDDERS

SUMMARY

See AIA Document A701 (2018 Edition), Instructions to Bidders bound in the Project Manual following this page.

Modifications and additions to the provisions in the Instruction to Bidders are included in Section 00 2213 - Supplementary Instructions to Bidders.

END OF INSTRUCTIONS TO BIDDERS

DRAFT AIA® Document A701™ - 2018

Instructions to Bidders

for the following Project:

(Name, location, and detailed description)

«Johnson County Courthouse – Second Level Courtroom Renovation»
«417 South Clinton St.»
«Iowa City, IA »

THE OWNER:

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

«Johnson County, Iowa by its Board of Supervisors»« »
«Attn: Ray Forsythe»
«913 S. Dubuque St.»
« Iowa City, IA 52240 »

THE ARCHITECT:

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

«Neumann Monson, Inc.»« »
«221 E. College St., Suite 303»
«Iowa City, IA 52240 »
« »

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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.

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

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

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



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ARTICLE 1 DEFINITIONS

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

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

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

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

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

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

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

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

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

ARTICLE 2 BIDDER'S REPRESENTATIONS

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

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

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

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

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

«As described in Section 00 2213 – Supplementary Instructions to Bidders»

§ 3.1.2 Any required deposit shall be refunded to Bidders who submit a bona fide Bid and return the paper Bidding Documents in good condition within ten days after receipt of Bids. The cost to replace missing or damaged paper

documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder's deposit will be refunded.

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

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

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

§ 3.2 Modification or Interpretation of Bidding Documents

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

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

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

« As described in Section 00 2213 – Supplementary Instructions to Bidders »

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

§ 3.3 Substitutions

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

§ 3.3.2 Substitution Process

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

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

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

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

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

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

§ 3.4 Addenda

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

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

« As described in Section 00 2213 – Supplementary Instructions to Bidders »

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

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

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

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

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

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

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

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

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

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

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

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

§ 4.2 Bid Security

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

(Insert the form and amount of bid security.)

« As described in Section 00 1113 – Advertisement for Bids »

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

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

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

§ 4.3 Submission of Bids

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

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

« As described in Section 00 2213 – Supplementary Instructions to Bidders »

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

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

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

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

§ 4.4 Modification or Withdrawal of Bid

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

As described in Section 00 2213 – Supplementary Instructions to Bidders

§ 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.)

« As described in Section 00 2213 – Supplementary Instructions to Bidders »

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

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

§ 5.2 Rejection of Bids

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

§ 5.3 Acceptance of Bid (Award)

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

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

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

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

§ 6.2 Owner's Financial Capability

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

§ 6.3 Submittals

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

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

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

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

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

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

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

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

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

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

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

«One Hundred percent (100%)»

§ 7.2 Time of Delivery and Form of Bonds

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

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

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

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

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

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

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

« »

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

« »

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

« »

- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013.)

« »

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda:

Number	Date	Pages

.8 Other Exhibits:

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

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

« »

[] The Sustainability Plan:

Title	Date	Pages

[] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
As bound within Project Manual			

.9 Other documents listed below:

(List here any additional documents that are intended to form part of the Proposed Contract Documents.)

« »

SECTION 00 2213

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

A General:

1. Types of Bids: Bids shall be made as lump sum bids as described in the documents.
2. Time and Place:
 - a. Bids will be received at the Auditor's Office, Johnson County Administration Building, 913 South Dubuque Street, Iowa City, IA 52240 before 2:00 p.m. CDT on Thursday, October 20, 2022. Bids received after this time will not be accepted.
3. Pre-Bid Site Visit:
 - a. A pre-bid site visit is available for all bidders.
 - i. Date: Tuesday, October 11, 2022, 8:30 a.m. Central time
 - ii. Location: 417 S. Clinton St. Iowa City, IA 52240
4. Documents:
 - a. Electronic Procurement Documents may be viewed online through the Johnson County website address: <https://www.johnsoncountyiowa.gov/bids-and-proposals>.
5. Architect's Opinion of Probable Cost:
 - a. The Architect's Opinion of Probable Cost for Project 4 is \$2,000,000.

B Bid Documents:

1. Examination:
 - a. Bidders shall carefully examine the Project Manual to obtain first-hand knowledge of the project. Contractors will not be given extra payment for conditions which can be determined by examining the documents.
2. Questions:
 - a. Submit all questions to the Architect, in writing. Direct questions to Scott Palmberg, AIA, spalmberg@neumannmonson.com. Replies will be issued to all Bidders of record as addenda to the documents and will become part of the contract. The Architect and Owner will not be responsible for oral clarification. Questions received less than seven (7) business days before bid opening will not be answered.
3. Substitutions:
 - a. No substitution for the materials and equipment described in the contract documents will be considered during the bid period unless written request has been submitted to Neumann Monson Architects, 221 East Street, Suite 303, Iowa City, Iowa 52240, ATTN: Scott Palmberg. These considerations must be received at least seven (7) business days prior to the date set for receipt of quotes.
 - b. Each such request shall include a complete description of the proposed substitute, the name of the material or equipment for which it is to be substituted, drawings, cuts,

performance and test data and any other data or information necessary for a complete evaluation.

- c. If Architect approves any proposed substitution, such approval shall not be considered official until it is set forth in an addendum. Bidders are cautioned to refrain from including in their bid any substitutions which are not confirmed by written addenda.

C Bid Submittal Procedures:

1. Preparation of Bids:

- a. Bids shall be made on unaltered copies of the bid form included in this manual. Fill in all required blank spaces and submit one (1) original copy.
- b. Bids not signed by individuals making them must have attached thereto a power of attorney evidencing authority to sign bid in name of the person for whom it is signed.
- c. Bids signed for a co-partnership must be signed by all co-partners or by an attorney-in-fact. If signed by an attorney-in-fact, there must be attached to bid a power of attorney evidencing authority to sign bid.
- d. Bids signed for a corporation shall be signed with the legal name of the corporation, followed by the name of the state of incorporation and the legal signatures of an officer authorized to bind the corporation to a contract.
- e. Bids signed for any other legal entity shall have attached thereto evidence of the authority of the person signing.

2. Submission of Bids:

- a. Bidders shall submit bids in a sealed, opaque envelope with the name of the project clearly stated on the front:
 - i. Johnson County Courthouse – Second Level Courtroom Renovation
 - ii. Name of Bidder.
- b. The Owner, Johnson County, is not responsible for delays occasioned by the U.S. Postal Service or any other means of delivery employed by the Bidder. Similarly, the Owner is not responsible, and will not open, any quote responses that are received on or after the time stated above. Late submittals will be retained, unopened. No responsibility will be attached to any person for premature opening of a bid not properly identified.

3. Modification and Withdrawal:

- a. Bids may not be modified after submittal.
- b. Bids may be withdrawn at any time prior to bid opening, but may not be resubmitted.
- c. No bid may be withdrawn for a period of thirty (30) days after the bid opening.

4. Disqualification:

- a. The Owner reserves the right to disqualify bids, before or after opening, upon evidence of collusion with intent to defraud or other illegal practices upon the part of the bidder.

5. Governing Laws and Regulations:

- a. The Bidder's attention is directed to the fact that all applicable federal, state, and municipal laws and ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout, and they will be deemed to be included in the contract as though therein written out in full.

6. Award and Execution of Contract:
 - a. The Owner reserves the right to reject any and all bids, to waive minor informalities in any bid, or to make award in the best interest of the Owner.
 - b. Bids will be evaluated on the date above. A bid tabulation summary will be provided to all companies who submitted a bid. Bid results will not be given over the telephone.

7. Execution of Contract:
 - a. The Owner reserves the right to accept any bid, in accordance with the Code of Iowa, to reject any bid on the basis of quote irregularity or to waive irregularities.
 - b. Each bid shall be prepared, if so requested by the Owner, to present evidence of experience, qualifications, and financial responsibility to carry out the terms of the contract.
 - c. Notwithstanding any delay in preparation and execution of the formal contract agreement, each bid shall be prepared, upon written notice of quote acceptance, to commence work within fourteen (14) days following the receipt of official written orders of the Owner to proceed, or on date stipulated in such order.
 - d. Contract form will be the "Standard Form of Agreement between Owner and Contractor," AIA Form 101, with Johnson County's specified modifications to contract language, or a negotiated contract prepared by the Owner and agreed upon by the Contractor and signed by the Johnson County Director and Contractor. Contract Documents include any Addenda issued by Owner, the Project Manual dated September 23, 2022 by Neumann Monson Architects (the "Project Manual"), AIA Document 101 (Owner-Contractor Agreement Form) as modified by Division 00 7000 and their subparts in the Project Manual, and the Drawings in the solicitation for quotes for this Project. This contract will authorize the Work to begin, assuming insurance requirements have been met.
 - e. All bids shall be presumed to be a bid submitter's best-and-final offer. Any bid exception, stipulation, counter-offer, requirement, and/or other alternative term or condition (e.g. quote submitter's alternative contract form) to language within the Contract Documents shall be justification to reject a response to this solicitation, in Owner's sole discretion.

8. Completion Date:
 - a. All bidders shall take into account the Owner's desire that construction be substantially complete July 1, 2023.

END OF SECTION 00 2113

SECTION 00 2613

PRE-BID SUBSTITUTION REQUEST FORM

PROJECT: JOHNSON COUNTY COURTHOUSE - SECOND LEVEL COURTROOM RENOVATION

BID DATE:

SUBMIT REQUEST FOR SUBSTITUTIONS DURING THE BIDDING PHASE TO:

NEUMANN MONSON, INC., 221 East College Street, Suite 303, Iowa City, Iowa 52240

REQUEST FROM: _____ **DATE:** ___/___/___

SPECIFICATION SECTION/TITLE: _____ - _____

Description: _____; Article/Paragraph: _____.

Proposed Substitution: _____.

Manufacturer: _____.

Trade Name: _____; Model: _____.

ACKNOWLEDGEMENTS AND ATTACHMENTS

In submitting this Pre-Bid Substitution Request, the Undersigned acknowledges and represents that:
Proposed substitution has been personally investigated and determined to be equal or superior in all respects to specified Product;
Same warranty will be furnished for proposed substitution as for specified Product;
Same maintenance service and source of replacement parts, as applicable, is available;
Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule;
Proposed substitution does not affect dimensions and functional clearances; and
All contract requirements shall be met.

Attachments: The following attachments are considered an integral part of this Pre-Bid Substitution Request:

_____ Product Data, descriptions and Specifications necessary for evaluation.

_____ Drawings necessary to indicate proper installation in the Work.

_____ Tests and Reports consistent with specified performance requirements.

SUBMITTED BY: _____, (Title) _____

Firm name: _____

Telephone: _____ Fax: _____

ARCHITECT'S REVIEW AND ACTION

_____ Pre-Bid Substitution approved - Make submittals in accordance with Section 01 3300.

_____ Pre-Bid Substitution rejected - Use specified Products.

Reviewed by: _____ Date: _____.

END OF PRE-BID SUBSTITUTION REQUEST FORM

**SECTION 00 4113
BID FORM**

**To: Johnson County Auditor's Office
913 S. Dubuque St.
Iowa City, IA 52240**

**ATTN: Johnson County Courthouse – Second Level Courtroom Renovation
Ray Forsythe, Special Projects Manager**

The undersigned Bidder, having examined the Drawings and Specifications, and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes to furnish all labor, materials and supplies, and to construct the project in accordance with the proposed Contract Documents, within the time set forth therein, and at the prices stated below. These rates are to cover all expenses incurred in performing the work required under the proposed Contract Documents, of which this bid is a part.

Bidder acknowledges receipt of the following Addenda which are a part of the Documents: Numbers

____, _____, _____, _____, _____.

BASE BID:

1. Bidder agrees to perform all the work described in the proposed Contract Documents and shown on the Drawings for the sum of:

_____ DOLLARS (\$_____)

Amount shall be indicated in both words and figures. In case of discrepancy, the amount indicated in words will govern.

2. The undersigned Bidder states that full compliance with the proposed Contract Documents is maintained in this bid.

3. Bidder understands that the Owner reserves the right to reject any and all bids, waive irregularities or technicalities in any bid, and accept any bid in whole or in part which is deemed to be in its best interest.

4. Bidder agrees that this bid shall be good and may not be withdrawn for a period of sixty (60) calendar days after the public opening and reading of the bids.

5. Bidder hereby certifies: (a) that this bid is genuine and is not made in the interest of or on behalf of any undisclosed person, firm or corporation; (b) that Bidder has not directly or indirectly induced or solicited any other Bidder to put in a false or sham bid; (c) that Bidder has not solicited or induced any person, firm or corporation to refrain from bidding; and (d) that Bidder has not sought by collusion to obtain any advantage over any other quote Bidder or over the Owner; (e) that Bidder fully understands this quote solicitation and the Contract Documents in their entirety and in detail, including the Instructions to Bidder in the Project Manual, has made any inquiries to the Owner as necessary to gain such understanding, and understands that Owner reserves the right to disqualify any Bidder or cancel and award, if made, to any Bidder who demonstrates less than such understanding in Owner's sole discretion, at no fault, cost, or liability whatsoever to the Owner.

6. Bidder acknowledges they have included all Allowances as specified in Section 01 21 00.

ALTERNATES

1. Refer to Section 01 2300 for more detailed descriptions.
2. Alternates are identified by number and describe the basic changes to be incorporated into the Work only when that Alternate is made a part of the Work by specific provisions in the Owner-Contractor Agreement. Bidder, in submitting his bid proposal, shall include, in addition to his base bid, the following alternate. Coordinate pertinent related work and modify surrounding work as required to properly integrate the work under each Alternate and to provide the complete construction required by the Contract Documents.

3. Alternate No. 1.: Cast Underlayment

ADD / DEDUCT (circle one) _____ dollars.
(\$ _____).

FIRM NAME: _____

SUBMITTED BY: _____

TITLE: _____

DATE: _____ Incorporated ___ YES ___ NO

OFFICIAL ADDRESS: _____

CONTACT EMAIL: _____

CONTACT TELEPHONE NUMBER: _____

FEDERAL TAX IDENTIFICATION NUMBER: _____

END OF SECTION 00 4113

SECTION 00 4313

BID BOND

FORM OF BID BOND

KNOW ALL MEN BY THESE PRESENTS, THAT WE,

(Firm Name) _____

(Business address) _____

(City, State, Zip Code) _____

as Principal, hereinafter called the Principal, and

(Surety) _____

a corporation duly organized under the laws of the State of _____ as surety,
hereinafter called the Surety, are firmly bound unto

Owner
address

as Obligee, hereinafter called the Obligee, in the penal sum of Five Percent (5%) of the total Bid,
_____ Dollars (\$_____)

in lawful money of the United States, for the payment of which sum well and truly to be made, we the
said Principal and the said Surety bind ourselves, our heirs, executors, administrators, successors and
assigns, jointly and severally, firmly by these presents.

WHEREAS, THE PRINCIPAL HAS SUBMITTED THE ACCOMPANYING BID FOR

Construction of: Johnson County Courthouse Second Level Courtroom Renovation

(Address) _____

(City, State, Zip Code) _____

NOW, THEREFORE,

if the Principal shall not withdraw said bid within the period specified, within 45 days after said opening,
and shall, within the period specified therefore, or, if no period be specified, within seven (7) days after
the prescribed forms are presented for signature, enter into a written contract with the Owner, in
accordance with the bid as accepted and give bond with good and sufficient surety or sureties, as may
be required for the faithful performance and proper fulfillment of the contract, then the above obligation
shall be void and of no effect, otherwise to remain in full force and effect.

By virtue of statutory authority, the full amount of this bid bond shall be forfeited to the obligee in
liquidation of damages sustained in the event that the Principal fails to execute the contract and
provide the bonds required by the specifications and by law.

In witness whereof, the parties have executed this instrument under their several seals this the name
and corporate seal of each corporate party being hereto affixed and these presents duly signed by the
undersigned representatives pursuant to authority of the governing bodies.

Signed and sealed this _____ day of _____, 2022.

(Witness) _____ (Principal) _____

(Title) _____ (Seal)

(Witness) _____ (Surety) _____

(Title) _____ (Seal)

END OF BID BOND

SECTION 00 5000
CONTRACTING FORMS AND SUPPLEMENTS

PART 1 GENERAL

1.01 AGREEMENT AND CONDITIONS OF THE CONTRACT

- A. The Agreement form is AIA A101. See Section 00 5200.
- B. The General Conditions form is AIA A201. See Section 00 7200.
- C. See Section 00 7313 for Supplementary Conditions.
- D. See Section 00 7413 for Special Conditions.

1.02 FORMS

- A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in Contract Documents.
- B. Bond Forms:
 - 1. Performance and Payment Bond Form: AIA A312.
- C. Post-Award Certificates and Other Forms:
 - 1. Submittal Transmittal Letter Form: Contractor's form, as approved by Owner or Architect.
 - 2. Certificate of Insurance Form: ACORD Certificate of Insurance 25.
 - 3. Schedule of Values Form: AIA G703.
 - 4. Consent of Surety to Reduction of Retainage Form: Standard Form from Surety.
 - 5. Construction Schedule Form: Contractor's Form.
- D. Clarification and Modification Forms:
 - 1. Request for Interpretation Form: Contractor's Form.
 - 2. Supplemental Instruction Form: Architect's Form.
 - 3. Construction Change Directive Form: AIA G714.
 - 4. Request for Proposal Form: Architect's Form.
 - 5. Change Order Form: AIA G701.
- E. Closeout Forms:
 - 1. Contractor's Request for Substantial Completion Inspection: See Document 00 6513.
 - 2. Contractor's Certificate of Final Completion Form: See Document 00 6515.
 - 3. Affidavit of Payment of Debts and Claims Form: AIA G706.
 - 4. Contractor's Affidavit of Release of Liens Form: AIA G706A
 - 5. Consent of Surety to Final Payment Form: AIA G707.
- F. Quality Assurance and Background Policy Forms.
 - 1. General Contractor Quality Assurance Questionnaire
 - 2. Subcontractor Quality Assurance Bid Requirements

1.03 REFERENCE STANDARDS

- A. AIA A101 - Standard Form of Agreement Between Owner and Contractor where the basis of Payment is a Stipulated Sum.
- B. AIA A312 - Performance Bond and Payment Bond.
- C. AIA G701 - Change Order.
- D. AIA G703 - Continuation Sheet.
- E. AIA G706A - Contractor's Affidavit of Release of Liens.
- F. AIA G707 - Consent of Surety to Final Payment.
- G. AIA G714 - Construction Change Directive.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION



BOARD OF SUPERVISORS

Royceann Porter, Chairperson
Lisa Green-Douglass, Vice Chairperson

Jon Green
Pat Heiden
Rod Sullivan

Johnson County Post Bid General Contractor Quality Assurance Questionnaire Policy

Background and Policy

Pursuant to Iowa Code §26.9 which requires that contracts for public improvements be awarded to the "lowest responsive, responsible bidder," Iowa law recognizes that a governmental entity may obtain information from the lowest responsive bidder to determine bidder's responsibility relating to the bidder's experience, number of employees, and ability to finance the cost of the public improvement; accordingly, the Board of Supervisors hereby adopts this policy requiring submission of the General Contractor Quality Assurance Questionnaire by the apparent lowest bidder on Vertical Infrastructure Projects. The fully completed Questionnaire shall be submitted to the Johnson County Special Projects Manager within 14 calendar days of notification to the apparent lowest bidder. Contractors who do not complete the following questionnaire may be deemed non-responsive or non-responsible.

Definition of Vertical Infrastructure Project

"Vertical Infrastructure Project" for purposes of the Policy is defined as construction, addition, or major alteration of a facility that will require a certificate of occupancy that:

1. is to be bid and constructed by Johnson County;
2. with an estimated construction cost in excess of \$500,000,
3. is funded without federal, state or other funding that would prohibit or limit use of the Questionnaire.

The Board of Supervisors will be provided with the General Contractor Quality Assurance Questionnaire of the apparent lowest bidder for the Board's consideration in determining the lowest responsive, responsible bidder in accordance with Section 26.9 of the Iowa Code.



JOHNSON COUNTY, IOWA
Post-Bid Information

GENERAL CONTRACTOR QUALITY ASSURANCE
QUESTIONNAIRE

Pursuant to Iowa Code §26.9 which requires that contracts for public improvements be awarded to the "lowest responsive, responsible bidder," and also recognizes that a governmental entity may obtain information from the lowest responsible bidder to determine bidder's responsibility relating to the bidder's experience, number of employees, and ability to finance the cost of the public improvement, and in accordance with Iowa law allowing public entities to consider factors other than price in determining who is the lowest responsible bidder; Johnson County does hereby provide the following Questionnaire to the bidder to whom award of a Contract is under consideration ("Contractor") submitting bids for work on the _____ ("Project"). The fully completed Questionnaire, with attachments, shall be submitted to the Special Project Manager **within 14 calendar days of notification** to the apparent lowest bidder. Contractors who do not complete the following questionnaire may be deemed to be non-responsive or non-responsible.

1. Full name of Contractor _____
 Address _____
 Telephone _____ Fax _____
 Email _____

2. All other names under which Contractor has operated in the past five (5) years: _____

3. Provide Contractors' Registration Number and full names of Registration Holders as per Iowa Construction Contractor Registration requirements: _____

 Contractor Registration Expiration Date _____

4. Has Registration ever been suspended or revoked in any jurisdiction?
 - a. Yes ___
 - b. No ___
 If "yes", provide information regarding suspension/revocation and attach all relevant documents.

5. Within the past five (5) years, has Contractor been debarred by any federal, state or local governmental entity from bidding on projects?
 - a. Yes ___
 - b. No ___If "yes", provide information related to debarment.
6. On a separate sheet, list construction projects in value in excess of \$5 million dollars that Contractor has in progress, giving the name of the project, owner, architect, contract amount, key Contractor personnel, percent complete and scheduled completion date.
7. On a separate sheet, list the major projects Contractor has completed in the past three (3) years, giving the name of the project, owner, architect, contract amount, Officer in Charge, Project Manager, Project Superintendent and any other key Contractor personnel, date of completion and percentage of the total project performed by your own employees.
8. On a separate sheet, identify the individuals Contractor intends to be the Officer in Charge, Project Manager, Project Superintendent and any other key personnel on this project.
9. On a separate sheet, list the Contractors last five (5) completed projects, and for each, the scheduled completion date and the final completion date, noting any owner approved extensions.
10. Within the past three (3) years, has Contractor defaulted on a contract, or been disqualified, removed or otherwise prevented from bidding on or completing any project?
 - a. Yes ___
 - b. No ___If "yes", provide the year of the incident, name, address and telephone number of the owner of the project, project name and location.
11. Has Contractor ever been unable to obtain a bond or been denied a bond?
 - a. Yes ___
 - b. No ___If "yes", please provide all relevant details.
12. On a separate sheet, list all surety/bonding companies Contractor has utilized in the past five (5) years.
13. Has Contractor ever declared bankruptcy or been in receivership?
 - a. Yes ___
 - b. No ___If "yes", please provide all relevant details.
14. Is Contractor currently being investigated for or previously been found to have violated in the past five (5) years any of the following state or federal laws: Iowa Minimum Wage Act; Iowa

Non-English Speaking Employees Act; Iowa Child Labor Act; Iowa Labor Commissioner's Right to Inspect Premises, Iowa Compensation Insurance Act; Iowa Employment Security Act; Iowa Competition Act; Iowa Income, Corporate and Sales Tax Code; a "willful" violation of the Iowa or Federal Occupational Safety and Health Act; Iowa Employee Registration Requirements; Iowa Hazardous Chemical Risks Act; Iowa Wage Payment Collection Act; Federal Income and Corporate Tax Code; The National Insurance and Social Security Act; The Fair Labor Standards Act:

a. Yes ___

b. No ___

If "yes", please explain:

15. Has Contractor ever failed to complete any work awarded to it?

a. Yes ___

b. No ___

If "yes", please provide all relevant details.

16. Are there any judgments, arbitration proceedings or suits pending or outstanding against Contractor or its officers that relate to, arise out of or are in the course of the Contractor's business?

a. Yes ___

b. No ___

If "yes", please provide all relevant details.

17. Has Contractor filed any lawsuit or demanded arbitration with regard to any construction contract within the past five (5) years?

a. Yes ___

b. No ___

If "yes", please provide all relevant details.

18. Has Contractor been found by a court or agency of competent jurisdiction to be delinquent in meeting its obligations under local, state or federal tax laws within the last five (5) years? ("delinquent" shall include, but is not limited to: failure to file, failure to pay or imposition of tax liens)

a. Yes ___

b. No ___

If "yes", please provide all relevant details.

19. Contractor affirms that it will retain only subcontractors who can fully comply with the bid specifications, including those that address requirements concerning the Subcontractor Quality Assurance Bid Requirements.

- a. Yes ___
- b. No ___

20. Contractor affirms that it will be responsible for ensuring that each subcontractor meets the Subcontractor Quality Assurance Bid Requirements.

- a. Yes ___
- b. No ___

21. Contractor agrees to submit to the Johnson County Special Projects Manager a list of all intended subcontractors **within 14 calendar days on notification** to the apparent lowest bidder. (In the event Contractor wishes to replace any originally- designated subcontractor or add a subcontractor, such may only occur with the approval of Johnson County. Such approval will not be unreasonably withheld)

- a. Yes ___
- b. No ___

22. Contractor attests that it will comply with each of the following:

Iowa's Minimum Wage Law:

- a. Yes ___
- b. No ___

Maintain workers' compensation insurance or be qualified as a self-insurer and provide proof of insurance or ability to self-insure upon request.

- a. Yes ___
- b. No ___

Properly license Contractor employees with the appropriate licensing authority.

- a. Yes ___
- b. No ___

23. Contractor will make available to the County or County's representative, upon County's request, documentation to satisfy the County, in Counties' sole discretion, that the Contractors' workers utilized on this project are actual employees, with unemployment and workers' compensation coverage not "leased employees" or independent contractors.

- a. Yes ___
- b. No ___

24. That Contractor will provide with this Questionnaire, the name, address, phone number and name of contact for three (3) entities which will provide references.

- a. Yes ___
- b. No ___

25. Contractor will only utilize on-site employees who have completed the Occupational Safety and Health Act (OSHA) 10 hour Construction Industry Training Program.

- a. Yes ___
- b. No ___

Provide Contractor's Federal ID Number _____

Provide Name and address of Contractor's Registered Agent _____

I hereby certify, that (1) all of the information provide by me in this Questionnaire is true and correct to the best of my knowledge; (2) I am authorized to sign this Questionnaire on behalf of the Contractor whose name appears in Question #1; (3) if any of the information I have provided herein becomes inaccurate, prior to execution of any Project Contract. I will immediately provide the Special Project Manager with updated accurate information in writing; and (4) I hereby authorize any person or entity named herein to provide the Special Project Manager with whatever information might be required to verify this Questionnaire.

THIS STATEMENT MUST BE NOTORIZED

NAME OF CONTRACTOR _____

BY: _____

Signature

Title

Type/Print Name

Date

STATE OF IOWA, _____ County, ss:

Subscribed and sworn to before me by the said _____ on this day of

_____, 20____

Notary Public in and for the State of Iowa

Contractor Name

JOHNSON COUNTY

SPECIAL PROVISION
CONTRACTURAL REQUIREMENTS
ON
<PROJECT NAME>

SUBCONTRACTOR QUALITY ASSURANCE
BID REQUIREMENTS

The following requirements are intended to be included in the Quality Assurance Sections of the Bid Specifications which the General Contractor will, along with all other quality assurance requirements, be required to manage:

FOR ALL SUBCONTRACTORS

Subcontractor must not be under current investigation for or previously have been found to have violated in the last five (5) years any of the following state or federal laws: Iowa Minimum Wage Act, Iowa Non-English Speaking Employees Act, Iowa Child Labor Act, Iowa Labor Commissioner's Right to Inspect Premises, Iowa Compensation Insurance Act, Iowa Employment Security Act, Iowa Competition Act, Iowa Income, Corporate and Sales Tax Code, a "willful" violation of the Iowa or Federal Occupational Safety and Health Act, Iowa Employee Registration Requirements, Iowa Hazardous Chemical Risks Act, Iowa Wage Payment Collection Act, Federal Income and Corporate Tax Code, The National Insurance and Social Security Act, The Fair Labor Standards Act. Subcontractor must notify the Contractor of any current investigation of Subcontractor for violation of any of the above laws.

Subcontractor will only utilize Subcontractor on-site employees that have completed the Occupational Safety and Health Act (OSHA) 10 hour Construction Industry Training Program.

Subcontractor must properly license employees with the appropriate licensing authority.

Subcontractor at all levels, that is even a subcontractor of a subcontractor, will only utilize workers on this Project that have unemployment and workers compensation coverage provided by the subcontractor by which the worker is employed. Subcontractor will make available to General Contractor or Owner such documentation that is necessary to satisfy Owner, in Owner's sole discretion, that subcontractor is in compliance with this provision.

FOR SELECTIVE SUBCONTRACTS

List those subcontracts that will apply

SECTION 00 5100

NOTICE OF AWARD

PROJECT: JOHNSON COUNTY COURTHOUSE - SECOND LEVEL COURTROOM RENOVATION

OWNER: Johnson County, Iowa

ARCHITECT: Neumann Monson, Inc.

221 East College Street, Suite 303, Iowa City, IA 52240

TO (CONTRACTOR): _____

(Address)

Representative: _____

CONTRACT FOR: Johnson County Courthouse - Second Level Courtroom Renovation

ARCHITECT'S RECOMMENDATION FOR ACCEPTANCE OF THE BID:

The undersigned, Architect of the above designated Project, hereby recommends that:

The Bid submitted by (Contractor) has been reviewed and found, to the Architect's best information and belief, to be in compliance with procurement provisions for the designated Project.

The contract sum of \$ _____ is determined on the following basis:

Base Bid: \$ _____

Alternate No. 1: \$ _____

Total: \$ _____

I recommend that the Bidder's Offer be accepted and a Contract be issued for construction of the Project.

Neumann Monson, Inc.

By _____ Date _____

(Authorized Representative)(Title)

OWNER'S ACCEPTANCE OF THE BID AND INTENT TO ENTER INTO A CONTRACT:

The undersigned, on behalf of Johnson County Courthouse - Second Level Courtroom Renovation, hereby affirms that the Bid submitted by your firm pursuant to the procurement requirements of the above referenced Project has been accepted and a Construction Contract has been authorized in accordance with provisions of the Contract Documents.

By _____ Date _____

(Authorized Representative)(Title)

NOTICE TO CONTRACTOR:

You are hereby notified that the Contract Time for the Project will commence on _____, which will be the effective date of the Owner - Contractor Agreement. You will be expected to start performing the obligations required by the Contract Documents on that date.

The date of Substantial Completion of the Work is _____.

Submit the required Surety Bonds within _____ after the _____.

Before commencing Work at the Project Site, prepare and submit the following:

Contractor's insurance certificates

List of subcontractors and major materials suppliers

Schedule of Values

Construction Progress Schedules

Submittal Schedule

Accepted by: (Contractor)

_____ Date _____
(Authorized Signature)(Title)

END OF NOTICE OF AWARD

**SECTION 00 5200
AGREEMENT FORM**

PART 1 GENERAL

1.01 FORM OF AGREEMENT

1.02 THE AGREEMENT TO BE EXECUTED IS ATTACHED FOLLOWING THIS PAGE.

1.03 RELATED REQUIREMENTS

- A. Section 00 7200 - General Conditions.
- B. Section 00 7313 - Supplementary Conditions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

DRAFT AIA® Document A101™ - 2017

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

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

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

« »« »
«7»
« »
« »

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

« »« »
« »
« »
« »

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

« »
« »
« »

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

« »« »
« »
« »
« »

The Owner and Contractor agree as follows.

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

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

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

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TABLE OF ARTICLES

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

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

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

ARTICLE 2 THE WORK OF THIS CONTRACT

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

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

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

- The date of this Agreement.
- A date set forth in a notice to proceed issued by the Owner.
- Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

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

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

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check one of the following boxes and complete the necessary information.)

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

[« »] By the following date: « »

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

Portion of Work	Substantial Completion Date

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

ARTICLE 4 CONTRACT SUM

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

§ 4.2 Alternates

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

Item	Price

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

Item	Price	Conditions for Acceptance

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

Item	Price

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

Item	Units and Limitations	Price per Unit (\$0.00)

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

« »

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

« »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

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

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

« »

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

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

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

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

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

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

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

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

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

§ 5.1.7 Retainage

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

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

« »

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

<< >>

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

<< >>

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

<< >>

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

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

§ 5.2 Final Payment

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

- .1 the Contractor has fully performed the Contract except for the Contractor’s responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

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

<< >>

§ 5.3 Interest

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

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

<< >> % << >>

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

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

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

<< >>

<< >>

<< >>

<< >>

§ 6.2 Binding Dispute Resolution

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

- [« »] Arbitration pursuant to Section 15.4 of AIA Document A201–2017
- [« »] Litigation in a court of competent jurisdiction
- [« »] Other (Specify)
- [« »]

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

ARTICLE 7 TERMINATION OR SUSPENSION

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

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

« »

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

ARTICLE 8 MISCELLANEOUS PROVISIONS

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

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

«»
«»
«»
«»
«»
«»

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

« »
« »
« »
« »
« »
« »

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

§ 8.5 Insurance and Bonds

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

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

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

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

« »

§ 8.7 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

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

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

« »

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda, if any:

Number	Date	Pages

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

.8 Other Exhibits:

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

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

SECTION 00 5500

NOTICE TO PROCEED

DATED: _____, 2022

TO (CONTRACTOR):(CONTRACTOR'S NAME)

(Address)

Representative: _____

PROJECT: JOHNSON COUNTY COURTHOUSE - SECOND LEVEL COURTROOM RENOVATION

OWNER: Johnson County, Iowa

Representative: _____.

ARCHITECT: NEUMANN MONSON, INC.

221 East College Street, Suite 303, Iowa City, IA 52240

CONTRACT FOR: _____

CONTRACT DATE: _____, 2022

You are hereby notified that the Contract Time stated for the Project will commence on _____.
By that date, start performing the obligations required by the Contract Documents. In accordance with
Article 3 of the Agreement, the date of Substantial Completion is _____.

Before commencing Work at the Project Site, deliver the Surety Bond and Certificates of Insurance
required by the Contract Documents.

AUTHORIZED BY: JOHNSON COUNTY, IOWA

(Authorized Signature)

(Title)

ACCEPTED BY: (CONTRACTOR'S NAME)

(Authorized Signature)

(Title)

(Date)

END OF NOTICE TO PROCEED

We understand that failure to include an item on the above list does not alter our responsibility to complete all Work in conformance with the Contract Documents. The above items will be completed or corrected within _____ days of the date of this Notice.

Please schedule and conduct the Architect's inspection as required to verify the status of the Work.

DEMONSTRATION AND TRAINING OF OWNER'S PERSONNEL:

The undersigned hereby certifies that demonstration and training of the Owner's personnel has been fully completed in accordance with requirements of Section 01 7900:

Owner's Representative: (Name)

By _____ Date _____

TESTING, ADJUSTMENT AND BALANCING OF HVAC SYSTEMS:

The undersigned hereby certifies that TAB work has been fully completed in accordance with requirements of Section 23 0593:

TAB Agency: (Name)

By _____ Date _____

ATTACHMENTS:

We have attached evidence of Inspection and Acceptance of the following Authorities having Jurisdiction:

Building Inspector: ___Y___N

Fire Marshal: ___Y___N

_____: ___Y___N

SUBMITTED BY: (Contractor's Name)

By _____ Date _____

(Authorized Representative)(Title)

END OF DOCUMENT

SECTION 00 6515

CONTRACTOR'S CERTIFICATE OF COMPLETION

PROJECT: JOHNSON COUNTRY COURTHOUSE - SECOND LEVEL COURTROOM RENOVATION

OWNER: Johnson County

TO (ARCHITECT): Neumann Monson, Inc.

221 East College Street, Suite 303, Iowa City, IA 52240

SUBMITTED BY: (CONTRACTOR)

(Address)

Representative: _____

DATE: [_____], 20__

CONTRACTOR'S STATEMENT OF FINAL COMPLETION:

We, the undersigned, do hereby certify that:

The Work provided pursuant to the Contract Documents for the above Project has been inspected and determined to be complete and in compliance with provisions of the Contract Documents.

The following Supporting Documents have been fully executed (in duplicate) and are included with this Statement:

- ___ FINAL APPLICATION FOR PAYMENT
- ___ AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS (AIA Doc. G706)
- ___ AFFIDAVIT OF RELEASE OF LIENS (AIA Doc. G706A)
- ___ CONSENT OF SURETY TO FINAL PAYMENT (AIA Doc. G707)
- ___ INSURANCE CERTIFICATE FOR COMPLETED OPERATIONS (ACORD Form 25-S)

(Contractor's Name)

By _____ Date _____

(Authorized Representative)(Title)

ARCHITECT'S REVIEW:

The undersigned, Architect of the above designated Project, hereby states that:

The Work performed by (Contractor) under this Contract is, to the Architect's best knowledge, information and belief, in substantial compliance with provisions of the Contract Documents.

The Certificate for Final Payment is a complete and accurate accounting of the cost of the Work performed in accordance with the Contract Documents, including all changes and modifications thereto.

The total cost of the Work as completed is \$ _____ including the following Change Orders.

C.O. No.1 dated _____ : Add \$ _____

C.O. No.2 dated _____ : Add \$ _____

Upon final inspection of the Work and receipt of required Closeout Documents, I have certified final payment for this Project as a condition of final acceptance of the Work by the Owner.

Neumann Monson, Inc.

By _____ Date _____

(Authorized Representative)(Title)

OWNER'S ACCEPTANCE OF THE WORK:

The undersigned, on behalf of _____, hereby affirms that the Work performed by _____ pursuant to the above referenced Contract is accepted and final payment has been authorized in accordance with provisions of the Contract.

By _____ Date _____

(Authorized Representative)(Title)

END OF DOCUMENT

SECTION 00 7200
GENERAL CONDITIONS

PART 1 - GENERAL

1.01 FORM OF GENERAL CONDITIONS

- A. The General Conditions applicable to this contract is attached following this page.

1.02 RELATED REQUIREMENTS

- A. Section 00 7313 - Supplementary Conditions.

1.03 SUPPLEMENTARY CONDITIONS

- A. Refer to Section 00 7313 - Supplementary Condition for amendments to these General Conditions.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOTUSED)

END OF SECTION

DRAFT AIA® Document A201™ - 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

<<>>

THE OWNER:

(Name, legal status and address)

<<

THE ARCHITECT:

(Name, legal status and address)

<< >>< >>

<< >>

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

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



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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

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

§ 1.1.2 The Contract

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

§ 1.1.3 The Work

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

§ 1.1.4 The Project

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

§ 1.1.5 The Drawings

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

§ 1.1.6 The Specifications

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

§ 1.1.7 Instruments of Service

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

§ 1.1.8 Initial Decision Maker

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

§ 1.2 Correlation and Intent of the Contract Documents

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

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

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

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

§ 1.3 Capitalization

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

§ 1.4 Interpretation

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

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

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

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

§ 1.6 Notice

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

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

§ 1.7 Digital Data Use and Transmission

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

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or

relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

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

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

§ 2.2 Evidence of the Owner's Financial Arrangements

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

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

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

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

§ 2.3 Information and Services Required of the Owner

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

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

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

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

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

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

§ 2.4 Owner's Right to Stop the Work

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

§ 2.5 Owner's Right to Carry Out the Work

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

ARTICLE 3 CONTRACTOR

§ 3.1 General

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

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

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

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

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

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as

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

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

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

§ 3.3 Supervision and Construction Procedures

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

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

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

§ 3.4 Labor and Materials

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

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

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

§ 3.5 Warranty

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

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

§ 3.6 Taxes

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

§ 3.7 Permits, Fees, Notices and Compliance with Laws

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

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

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

§ 3.7.4 Concealed or Unknown Conditions

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

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

§ 3.8 Allowances

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

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

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

§ 3.9 Superintendent

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

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

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

§ 3.10 Contractor's Construction and Submittal Schedules

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

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

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

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and

similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

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

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

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

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

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

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

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

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

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

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

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

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

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

§ 3.13 Use of Site

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

§ 3.14 Cutting and Patching

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

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

§ 3.15 Cleaning Up

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

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

§ 3.16 Access to Work

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

§ 3.17 Royalties, Patents and Copyrights

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

§ 3.18 Indemnification

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

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

ARTICLE 4 ARCHITECT

§ 4.1 General

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

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

§ 4.2 Administration of the Contract

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

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

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

§ 4.2.4 Communications

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

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

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

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

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

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

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

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

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

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

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

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in

number and means a Subcontractor or an authorized representative of the Subcontractor. The term “Subcontractor” does not include a Separate Contractor or the subcontractors of a Separate Contractor.

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

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

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

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

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

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

§ 5.3 Subcontractual Relations

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

§ 5.4 Contingent Assignment of Subcontracts

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

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

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

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

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

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

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

§ 6.2 Mutual Responsibility

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

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

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

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

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

§ 6.3 Owner's Right to Clean Up

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

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

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

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

§ 7.2 Change Orders

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

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

§ 7.3 Construction Change Directives

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

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

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

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

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

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

- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

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

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

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

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

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

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

§ 7.4 Minor Changes in the Work

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

ARTICLE 8 TIME

§ 8.1 Definitions

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

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

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

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

§ 8.2 Progress and Completion

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

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

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

§ 8.3 Delays and Extensions of Time

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

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

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

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

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

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

§ 9.2 Schedule of Values

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

§ 9.3 Applications for Payment

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

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

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

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

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

§ 9.4 Certificates for Payment

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

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

§ 9.5 Decisions to Withhold Certification

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

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

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

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

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

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

§ 9.6 Progress Payments

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

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

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

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

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

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

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

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

§ 9.7 Failure of Payment

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

§ 9.8 Substantial Completion

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

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

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

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

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

§ 9.9 Partial Occupancy or Use

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

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

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

§ 9.10 Final Completion and Final Payment

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

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

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

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

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

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

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

§ 10.2 Safety of Persons and Property

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

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

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

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

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

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

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

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

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

§ 10.2.8 Injury or Damage to Person or Property

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

§ 10.3 Hazardous Materials and Substances

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

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

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

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

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

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

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

§ 10.4 Emergencies

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

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

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

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

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

procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

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

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

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

§ 11.3 Waivers of Subrogation

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

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

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

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

§11.5 Adjustment and Settlement of Insured Loss

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

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

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

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

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

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

§ 12.2.2 After Substantial Completion

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

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

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

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

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

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

§ 12.3 Acceptance of Nonconforming Work

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

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

§ 13.2 Successors and Assigns

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

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

§ 13.3 Rights and Remedies

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

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

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect

timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

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

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

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

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

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

§ 13.5 Interest

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

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

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

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

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

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract

Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

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

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

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

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

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

§ 14.3 Suspension by the Owner for Convenience

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

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

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

§ 14.4 Termination by the Owner for Convenience

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

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

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

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work

properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

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

§ 15.1.2 Time Limits on Claims

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

§ 15.1.3 Notice of Claims

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

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

§ 15.1.4 Continuing Contract Performance

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

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

§ 15.1.5 Claims for Additional Cost

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

§ 15.1.6 Claims for Additional Time

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

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

§ 15.1.7 Waiver of Claims for Consequential Damages

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

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

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

§ 15.2 Initial Decision

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

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

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

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

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

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

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

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

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

§ 15.3 Mediation

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

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

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

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

§ 15.4 Arbitration

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

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

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

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

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party

provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

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

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



TRABAR

SECTION 00 7313

SUPPLEMENTARY CONDITIONS

A GENERAL CONDITIONS

1. AIA Document A201 "General Conditions of the Contract for Construction", 2017 Edition, Articles 1 through 15 inclusive, is a part of the construction contracts, and is incorporated herein as fully as if herein set forth.
2. Copies of this document are on file at and available from the Architect's office.

B SUPPLEMENTARY CONDITIONS

The following supplements modify, change, delete from, or add to the "General Conditions of the Contract for Construction." Where any article of the General Conditions is modified or any paragraph, subparagraph or clause thereof is modified or deleted by these supplements, the unaltered provisions of that article, paragraph, subparagraph, or clause shall remain in effect.

MODIFICATIONS OF ARTICLE 1 – GENERAL PROVISIONS

1.1 Miscellaneous Definitions

The term "Product" as used in these Supplementary Conditions includes materials, systems, and equipment.

The term "Project Manual" as used in these Supplementary Conditions includes the Quote Submittal Requirements, Conditions of the Contract and the Specifications.

MODIFICATIONS OF ARTICLE 3 – CONTRACTOR

3.6 Taxes

Change subparagraph 3.6 to the following

- 3.6.1 Iowa Sales Tax Exemption. In accordance with provisions of the Code of Iowa and the Iowa Administrative Rules, "Iowa Construction Sales Tax Exemption Certificates" will be issued for this project. DO NOT include Iowa sales tax or local option sales tax in determining the project quote amount. The successful quote Submitter, within 48 hours of the receipt of "Owner's Notice of Intent to Award a Contract," shall provide to the Owner a list of all Subcontractors selected to perform work on this project. The subcontractor list shall include each firm's name, tax identification number, and address.
- 3.6.2 Using information provided by the successful quote Submitter, the Owner will apply to the Iowa Department of Revenue and Finance for 1) Authorization Letters and 2) Iowa Construction Sales Tax Exemption Certificates, to be issued to the Contractor and each Subcontractor to purchase materials and products for this project free of sales/use tax and local options taxes that might otherwise apply.

MODIFICATIONS OF ARTICLE 7 – CHANGES IN THE WORK

- 7.2.2 Add: Cost shall be limited to the following: Cost of materials, including cost of delivery, cost of labor, including Social Security, old age and unemployment insurance, and fringe benefits under collective bargaining agreements; Workman's Compensation insurance; bond premiums; and rental value of power tools and equipment. Overhead shall include the following: Supervision, superintendence, wages of timekeepers, watchmen and clerks, hand tools, incidentals, general office expense, and all other expenses not included in cost. The maximum percentage of combined overhead and profit for changes in the work performed by the Contractor shall be 10%. If the changed work is performed by a Subcontractor, a maximum of 10% may be added by that Subcontractor on his work for combined overhead and profit and an additional maximum of 5% may be added by the Contractor for administration and coordination of said Subcontractor work. The Contractor shall verify compliance of the Subcontractors and shall not sign Change Orders which do not comply with the maximum limits.

MODIFICATIONS OF ARTICLE 9 – PAYMENTS AND COMPLETION

At the end of Subparagraph 9.10.1, add the following:

- i. In accordance with Iowa law, Final Payment (retainage amount) shall not be released until at least thirty-one (31) days after completion and final acceptance by the Owner of all Work required by the Contract.

MODIFICATIONS OF ARTICLE 10 – PROTECTIONS OF PERSONS & PROPERTY

- 10.1.1 Add: Attention is directed to the regulations issued by the Secretary of Labor pursuant to Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 333) entitled "Safety and Health Regulations for Construction" (29 CFR Part 1926). The Contractor shall be required to comply with those regulations to the extent that any resulting Contract involves construction.

MODIFICATIONS OF ARTICLE 11 – INSURANCE AND BONDS

WORK SHALL NOT BEGIN UNTIL THE CERTIFICATE OF INSURANCE AND ALL REQUIRED ENDORSEMENTS ARE RECEIVED AND APPROVED BY JOHNSON COUNTY.

Delete original Subparagraph 11.1.1 and replace with the following:

A. Section 11.1.1 of the General Conditions of the Contract for Construction (AIA Document A201-2017) as included in this Project Manual (the "General Conditions") provides that Contractor shall purchase and maintain insurance coverage for limits as specified in the Contract Documents. The limits of liability for the insurance required by Section 11.1.1 of the General Conditions shall not be less than the following amounts or greater where required by laws and regulations:

1. Workers' Compensation: Statutory

2. Employer's Liability

Bodily Injury by Accident, Each Accident: \$ 500,000

Bodily Injury by Disease, Each Employee \$ 500,000

Policy Limit \$ 500,000

3. General Liability, including completed operations and product liability coverages and eliminating the exclusion with respect to property under the care, custody and control of Contractor

General Aggregate: \$ 2,000,000

Products – Completed Operations Aggregate: \$ 2,000,000

Personal and Advertising Injury (Per Person/Organization): \$ 1,000,000

Each Occurrence (Bodily Injury and Property Damage): \$ 1,000,000

Fire Legal Liability Damage Limit (any One Fire): \$ 50,000

Medical Expense Limit (Any One Person): \$ 5,000

Property Damage liability insurance will provide Explosion, Collapse, and Underground coverages. Policy shall include as a minimum the following coverages:

- a. Broad Form Property Damage Coverage.
- b. An elimination of the exclusions with respect to property under the care, custody or control of Contractor. In lieu of elimination of the exclusion, Contractor may provide Builder's Risk or Installation Floater coverage for property under the care, custody, or control of Contractor.
- c. Contractual Liability Coverage.
- d. Independent Contractor Coverage.

4. Automobile Liability

- a. Bodily Injury, Each Person: \$ 1,000,000; Each Accident: \$ 1,000,000
- b. Property Damage, Each Accident: \$ 1,000,000
- c. Combined Single Limit: \$ 1,000,000
- d. Policy shall include contractual liability coverage and coverage on all owned, nonowned, and hired vehicles.

5. The Contractual Liability coverage required by Sec. 11.1.1.8 of the General Conditions shall provide coverage for not less than the following amounts:

- a. Bodily Injury, Each Accident: \$ 1,000,000; Annual Aggregate \$ 2,000,000
- b. Property Damage, Each Accident: \$ 1,000,000; Annual Aggregate \$ 2,000,000

6. Additional insurances required:

- a. Umbrella. The stated limits of paragraphs A(1) through A(5) of this Article 3 can be obtained through individual policies or if Contractor desires to reduce underlying limits to minimums required by its insurance carrier, an umbrella policy must accordingly be provided to maintain overall total level of coverage. Any Umbrella insurance shall be written on an occurrence basis and pay on behalf form and shall include the same endorsements and additional insureds as required of the primary policies.

b. An excess umbrella policy (pay on behalf form) with limits of \$2,000,000 for Employer's liability, Contractor's General Liability, (bodily injury, personal injury and property damage), Automobile Liability, and Contractual Liability on a combined basis shall be provided. Any Excess insurance shall be written on an occurrence basis and pay on behalf form and shall include the same endorsements and additional insureds as required of the primary policies. Policy shall include Owner, Architect and any others required by Section 11.1 of the General Conditions as additional insureds.

B. Section 11.3.1.3 of the General Conditions is hereby deleted and replaced in its entirety with the following:

If the property insurance requires deductibles, the Contractor shall pay costs not covered because of such deductibles in the event of a claim arising from the Contractor's error or negligence.

C. Section 11.1.4 of the General Conditions provides that Contractor shall cause the commercial liability coverage required by the Contract Documents to include the Owner, among others, as an additional insured for certain claims.

1. Additional insureds coverage:

a. Insurance certificates shall specifically indicate by name the additional insureds which are to include Owner and Architect as well as other persons or entities so identified:

1) "Johnson County, Iowa, its officers and employees, and Architect shall be named as additional insureds" on the Contractor's, subcontractor's and independent contractor's liability insurance policies and certificates of insurance.

2) No Others

2. General Aggregate Limits specified above shall apply separately to this project by attachment of Additional Insured Endorsement, and Governmental Immunities Endorsement, text as given

below.

JOHNSON COUNTY, IOWA

ADDITIONAL INSURED ENDORSEMENT

Johnson County, Iowa, including all its elected and appointed officials, all its employees and volunteers, all its boards, commissions and/or authorities and their board members, employees, and volunteers, are included as Additional Insured with respect to liability arising out the Insured's work and/or services performed for Johnson County, Iowa. This coverage shall be primary to the Additional Insured, and not contributing with any other insurance or similar protection available to the Additional Insureds, whether available coverage be primary, contributing or excess.

A COPY OF ONE (1) ENDORSEMENT IS REQUIRED:

Cancellation and Material Changes Endorsement

Thirty (30) days Advance Written Notice of Cancellation, Non-Renewal, Reduction in insurance coverage and/or limits and ten (10) days written notice of non-payment of premium shall be sent to:

Ray Forsythe, Special Projects Manager
Johnson County Board of Supervisors Office
913 S. Dubuque Street
Iowa City, IA 52240-4273
Email: rforsythe@johnsoncountyiowa.gov

(Please note that Johnson County does accept a signed letter on the agent's letterhead, from the insured's insurance agent, confirming that the agent will provide notice as indicated above.)

The Contractor is required to purchase and maintain insurance coverage to protect the Contractor and Johnson County throughout the duration of this Contract as enumerated above in the minimum limits above written and the requirement shall be a part of the Contract. Failure on the part of the Contractor to maintain this insurance in full effect will be treated as a failure on the part of the Contractor to comply with these requirements and be considered sufficient cause to suspend the work, withhold payment(s), and/or be disqualified in the future.

The insurance policies shall be issued by insurers authorized to do business in the State of Iowa and currently having an A.M. Best Rating of "B+" or better. All policies shall be occurrence form. If Professional Liability coverage is written on a claim made policy form, the certificate of insurance must clearly state coverage is claims made and coverage must remain in effect for at least two years after final payment with the Contractor continuing to furnish Johnson County certificates of insurance.

The Contractor shall be responsible for deductibles and self-insured retentions in the Contractor's insurance policies.

The Contractor is required to give Johnson County notice of any change in coverage, specifically, any reduction in coverage and cancellation of coverage no less than thirty (30) days prior to the effective date of any non-renewal or cancellation of any policies required by the Contract.

JOHNSON COUNTY intends to be an Additional Insured with coverage being primary and not contributing with any other insurance or similar protection available to JOHNSON COUNTY whether any other coverage is primary, contributing or excess. JOHNSON COUNTY may require an endorsement preserving JOHNSON COUNTY's governmental immunities under such coverage. See attached.

In the case of any work sublet, the Contractor shall require subcontractors and independent contractors working under the direction of either the Contractor or a subcontractor to carry and maintain the same workers compensation and liability insurance required of the Contractor.

A Certificate of Insurance is required evidencing all required insurance coverage as provided above with any required endorsements attached so as to evidence their inclusion in the coverage. The Certificate of Insurance is due before the Contract can be approved.

The following address must appear in the Certificate Holder section:

Johnson County Board of Supervisors
913 S. Dubuque Street
Iowa City, IA 52240-4273

Email: Ray Forsythe: rforsythe@johnsoncountyiowa.gov

The Producer's contact person's name, phone number and e-mail address are required.

Certificate may be sent by e-mail (rforsythe@johnsoncountyiowa.gov) to the attention of Ray Forsythe.

At the end of Subparagraph 11.1.1 add the following:

Bonding Requirements: Applicable for construction or facility improvement contracts or subcontracts exceeding the simplified acquisition threshold (\$150,000), the awarding agency may accept the bonding policy and requirements of the recipient (State if Iowa) or sub-recipient (JOHNSON COUNTY) provided the awarding agency has made a determination that the awarding agency's interest is adequately protected. If such a determination has not been made, the minimum requirements shall be as follows:

- a. A bid guarantee from each Contractor equivalent to five percent (5%) of the bid price. The "bid guarantee" shall consist of a firm commitment such as a bid bond, certified check, or other negotiable instrument accompanying a bid as assurance that the Contractor will, upon acceptance of its bid, execute such contractual documents as may be required within the time specified.
- b. A performance bond on the part of the Contractor for 100 percent (100%) of the contract price. A "performance bond" is one executed in connection with a contract to secure fulfillment of all the Contractor's obligations under such contract.
- c. A payment bond on the part of the Contractor for 100 percent of the contract price. A "payment bond" is one executed in connection with a contract to assure payment as required by law of all persons supplying labor and material in the execution of the work provided for in the contract.

JOHNSON COUNTY, IOWA

GOVERNMENTAL IMMUNITIES ENDORSEMENT

(for use when including the County as an Additional Insured)

1. Nonwaiver of Government Immunity. The insurance carrier expressly agrees and states that the purchase of this policy and the including of Johnson County, Iowa as Additional Insured does not waive any of the defenses of governmental immunity available to Johnson County, Iowa under Code of Iowa Section 670.4 as it now exists and as it may be amended from time to time.
2. Claims Coverage. The insurance carrier further agrees that this policy of insurance shall cover only those claims not subject to the defense of governmental immunity under the Code of Iowa Section 670.4 as it now exists and as may be amended from time to time.
3. Assertion of Government Immunity. Johnson County, Iowa shall be responsible for asserting any defense of governmental immunity, and may do so at any time and shall do so upon the timely written request of the insurance carrier. Nothing contained in this endorsement shall prevent the carrier from asserting the defense of governmental immunity on behalf of Johnson County, Iowa.
4. Non-Denial of Coverage. The insurance carrier shall not deny coverage under this policy and the insurance carrier shall not deny any of the rights and benefits accruing to Johnson County, Iowa under this policy for reasons of governmental immunity unless and until a court of competent jurisdiction has ruled in favor of the defense(s) of governmental immunity asserted by Johnson County, Iowa.
5. No Other Change in Policy. The insurance carrier and Johnson County, Iowa agree that the above preservation of governmental immunities shall not otherwise change or alter the coverage available under the policy.

END OF SECTION 00 7313

SECTION 00 7413

SPECIAL CONDITIONS

CONTRACT COMPLIANCE PROGRAM

ARTICLE 1 - LIQUIDATED DAMAGES (NOT USED)

ARTICLE 2 - EMPLOYMENT PRACTICES

2.1 Statement of Intent:

It is the intent of Johnson County to assure equal employment opportunity in all Contract work.

Contractors are required to take affirmative action to ensure that applicants employed or seeking employment with them are treated equally without regard to race, color, creed, religion, national origin, sex, disability, marital status and age.

2.2 Assurance of Compliance:

Contractor shall submit an Equal Employment Opportunity Statement for the Owner's files.

During the course of the Contract, the Owner will monitor the Contractor's compliance with the EEO/Affirmative Action requirements. Noncompliance with the provisions set forth at the time of contract award may result in termination or suspension of the Contract in whole or in part.

END OF SPECIAL CONDITIONS

SECTION 01 1000

SUMMARY

PART 1 GENERAL

1.01 PROJECT

- A. Project Name: Johnson County Courthouse - Second Level Courtroom Renovation.
- B. Owner's Name: Johnson County, Iowa.
- C. Architect's Name: Neumann Monson Architects.
- D. The Project consists of the alteration to existing courtroom and office space to accommodate technology improvements and to address security and accessibility issues.

1.02 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 5000 - Contracting Forms and Supplements.
- B. Work required by the proposed Contract shall begin upon ISSUANCE OF THE OWNER'S "NOTICE TO PROCEED". The Work under this Contract shall have limited on-site access. Mobilization for Work on-site shall begin no earlier than October 3, 2022 and be completed, with all equipment placed in operation, on or before the anticipated Substantial Completion Date of April 3, 2023, subject to an extension of time which may be granted by the Owner.

1.03 DESCRIPTION OF WORK

- A. Scope of demolition and removal work is shown on drawings and specified in Section 02 4100.
- B. Scope of alterations and new construction work is shown on drawings.
- C. Services (Including but not limited to Plumbing, HVAC, Electrical Power and Lighting, Telecommunications, and Security): Alter existing system and add new construction, keeping existing in operation.
- D. Owner will remove the following items before start of work:
 - 1. Artwork.
 - 2. Portable equipment.
- E. Contractor is required to remove and deliver the following to Owner prior to start of work:
 - 1. Items indicated in Drawings.
- F. Contractor is required to remove and store the following prior to start of work, for later reinstallation by Contractor:
 - 1. Wood trim, as indicated.
 - 2. Partition wall, as indicated.
 - 3. Visual display items (markerboards, tackboards, chalkboards, tack strips, etc)
 - 4. Other items as indicated in Drawings

1.04 WORK BY OWNER

- A. Hazardous Materials Abatement: Johnson County, Iowa has contracted for selective demolition and abatement of portions of the existing room components. Those operations are expected to be completed prior to starting work under this Contract. Should suspected hazardous materials be found during work of this Contract, notify Owner and Architect immediately.
 - 1. Lead based paint: trace amounts of lead paint have been identified on the plaster walls and ceilings. Lead safe work practices shall be followed.
- B. Johnson County, Iowa has awarded a contract for supply and installation of the Audio/Video system. Those operations will be conducted simultaneously with work under this Contract. Cooperate fully with this Separate Contractor so Work on that contract may be carried out smoothly, without interfering with or delaying work under this Contract.
- C. Items noted NIC (Not in Contract) will be supplied and installed by Owner (OFOI) after Substantial Completion. Some items include:
 - 1. Movable cabinets.

2. Furnishings.
3. Small equipment.
4. Artwork.
5. AV items, including projectors and TV monitors.

1.05 OWNER-FURNISHED ITEMS

- A. The Work includes providing support systems to receive Owner's equipment, and mechanical and electrical connections.
- B. The Owner will arrange and pay for delivery of Owner-furnished items in accordance with the Contractor's Construction Schedule, and will inspect deliveries for damage.
- C. If Owner-furnished items are damaged, defective or missing, the Owner will arrange for replacement. The Owner will also arrange for manufacturer's field services, and the delivery of manufacturer's warranties and bonds to the Contractor.
- D. The Contractor is responsible for designating the delivery dates of Owner furnished items in the Contractor's Construction Schedule and for receiving, unloading and handling Owner-furnished items at the site.
- E. The Contractor is responsible for protecting Owner-furnished items from damage, including damage from exposure to the elements, and to repair or replace items damaged as a result of his operations.

1.06 OWNER OCCUPANCY

- A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.
- B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- C. Schedule the Work to accommodate Owner occupancy.

1.07 CONTRACTOR USE OF SITE AND PREMISES

- A. Construction Operations: Limited to areas noted on Drawings.
- B. Arrange use of site and premises to allow:
 1. Owner occupancy.
 2. Work by Others.
 3. Work by Owner.
 4. Use of site and premises by the public.
- C. Provide access to and from site as required by law and by Owner:
 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
 2. Do not obstruct roadways, sidewalks, or other public ways without permit.
- D. Time Restrictions:
 1. Limit conduct of especially noisy, malodorous, and dusty work to prior to 8:00 am or on weekends.
 2. Attic access shall be prior to 8:00 am or when Courtroom 3A is not in session; coordinate with Owner.
- E. Utility Outages and Shutdown:
 1. Limit disruption of utility services to hours the building is unoccupied.
 2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
 3. Prevent accidental disruption of utility services to facilities.

1.08 WORK SEQUENCE

- A. Coordinate work of the various Sections of Specifications to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items installed later.

- B. Verify characteristics of elements of interrelated operating equipment are compatible; coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduits, as closely as practicable; make runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. Execute cutting and patching to integrate elements of Work, uncover ill-timed, defective, and non-conforming Work, provide openings for penetrations of existing surfaces, and provide samples for testing if required. Seal penetrations through floors, walls, and roof.
- E. Coordinate construction schedule and operations with the Owner.

1.09 DEFINITIONS AND EXPLANATIONS

- A. Imperative language is used generally in the specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by the Contractor as if preceded by the phrase "The Contractor shall".
- B. The term "provide" means furnish and install, complete, and ready for intended use. Except as otherwise defined in greater detail, the term "furnish" means supply and deliver to the project site, including unloading, unpacking, inspecting, and storing until ready for receipt by Owner, installation, etc., as applicable.
- C. Except as otherwise defined in greater detail, the term "install" is used to describe operations at project site including assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations, as applicable.
- D. The term "indicated" is as cross-reference to graphics, notes or schedules on drawings, to other paragraphs or schedules in the specifications, and to similar means of recording requirements in contract documents. Where terms such as "shows", "noted", "schedules", and "specified" are used in lieu of "indicated", it is for purpose of helping reader locate cross-reference, and no limitations of location is intended.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2000
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Sum and Contract Time.
- C. Change procedures.
- D. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

- A. Section 00 5000 - Contracting Forms and Supplements: Forms to be used.
- B. Section 00 5200 - Agreement Form: Contract Sum, retainages, payment period.
- C. Section 00 7200 - General Conditions and Document 00 7313 - Supplementary Conditions:: Additional requirements for progress payments, final payment, changes in the Work.
- D. Section 01 2100 - Allowances: Payment procedures relating to allowances.
- E. Section 01 7700 - Closeout Procedures: Project record documents.

1.03 DEFINITIONS

- A. The term "day" as used in the Contract Documents shall mean calendar day, unless otherwise specifically defined.

1.04 SCHEDULE OF VALUES

- A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.
- C. Forms filled out by hand will not be accepted.
- D. Submit Schedule of Values in duplicate within 15 days after date established in Notice to Proceed.
- E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify site mobilization and bonds and insurance.
- F. Include in each line item, the amount of Allowances specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.
- G. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.
- H. Revise schedule to list approved Change Orders, with each Application For Payment.

1.05 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Make applications for progress payments in amounts equal to ninety-five percent (95%) of the value of Work completed, including cost of materials and equipment properly stored at the jobsite, less the amount of previous payments.
 - 1. The five percent (5%) contract retainage may become payable upon issuance of the Certificate of Substantial Completion. Refer to Section 01 7700 for additional requirements.
- B. Payment Period: Submit at intervals stipulated in the Agreement.
- C. Use Form AIA G702 and Form AIA G703, edition stipulated in the Agreement.
- D. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
- E. Forms filled out by hand will not be accepted.

- F. For each item, provide a column for listing each of the following:
 - 1. Item Number.
 - 2. Description of work.
 - 3. Scheduled Values.
 - 4. Previous Applications.
 - 5. Work in Place and Stored Materials under this Application.
 - 6. Authorized Change Orders.
 - 7. Total Completed and Stored to Date of Application.
 - 8. Percentage of Completion.
 - 9. Balance to Finish.
 - 10. Retainage.
- G. Execute certification by signature of authorized officer.
- H. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.
- I. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
- J. Submit one electronic and three hard-copies of each Application for Payment.
- K. Include the following with the application:
 - 1. Transmittal letter as specified for submittals in Section 01 3000.
 - 2. Construction progress schedule, revised and current as specified in Section 01 3000.
 - 3. Partial release of liens from major subcontractors and vendors.
 - 4. Project record documents as specified in Section 01 7700, for review by Owner which will be returned to the Contractor.
 - 5. Affidavits attesting to off-site stored products.
- L. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.06 MODIFICATION PROCEDURES

- A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or subcontractors of changes to Contract Documents.
- B. Minor Changes in the Work:
 - 1. Architect will issue supplemental instructions directly to Contractor authorizing minor changes in the Work (not involving adjustments to Contract Sum or Contract Time) on Architect's standard "Architect's Supplemental Instructions" (ASI) form.
- C. Construction Change Directives:
 - 1. Architect will issue a Construction Change Directive on Architects standard "Construction Change Directive" (CCD) form. The Construction Change Directive instructs Contractor to immediately proceed with changes in the Work that will involve adjustment of either Contract Sum or Contract Time, or both, for inclusion in a subsequent Change Order.
 - 2. CCD forms will be signed by Owner and Architect, and may be signed by Contractor.
 - 3. The CCD document will include detailed description of changes in the Work and will designate method of determining change in either Contract Sum or Contract Time, or both.
 - 4. Maintain detailed records on time and material basis of Work required by the CCD.
 - 5. After completion of change, submit itemized account and supporting data necessary to substantiate cost and time adjustments to Contract.
- D. Proposal Requests:
 - 1. For changes in the Work for which advance pricing is desired, Architect will issue a Proposal Request on Architect's standard "Proposal Request" (PR) form. The Proposal Request will include a detailed description of proposed changes in the Work that may

- involve adjustment of either Contract Sum or Contract Time, or both, with supplementary or revised Drawings and Specifications, if necessary.
2. Proposal Requests issued by Architect are for pricing consideration only. Contractor shall not consider them instructions either to stop Work in progress or to execute the proposed change.
 3. Within 15 days after receipt of Proposal Request, Contractor shall submit a quotation estimating cost adjustments to Contract Sum or Contract Time necessary to execute the proposed change.
 4. Only after Owner's acceptance of Proposal Request will adjustment of Contract Sum or Contract Time be included in a subsequent Change Order.
- E. Contractor-Initiated Proposals:
1. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation. Document any requested substitutions in accordance with Section 01 6000.
 2. Only after Owner's acceptance of Contractor-Initiated Proposal will adjustment of Contract Sum or Contract Time be included in a subsequent Change Order
- F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
 2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect.
 3. For pre-determined unit prices and quantities, the amount will be based on the fixed unit prices.
- G. Substantiation of Costs: Provide full information required for evaluation.
1. Provide the following data:
 - a. Quantities of products, labor, and equipment.
 - b. Taxes, insurance, and bonds.
 - c. Overhead and profit.
 - d. Justification for any change in Contract Time.
 - e. Credit for deletions from Contract, similarly documented.
 2. Support each claim for additional costs with additional information:
 - a. Origin and date of claim.
 - b. Dates and times work was performed, and by whom.
 - c. Time records and wage rates paid.
 - d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
 3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.
- H. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
- I. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.
- J. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
1. Indicate effect of the change in Work, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- K. Promptly enter changes in Project Record Documents.

1.07 APPLICATION FOR FINAL PAYMENT

- A. Final Payment shall be the remaining unpaid balance of the final contract sum.
- B. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- C. Application for Final Payment will not be considered until the following have been accomplished:
 - 1. All closeout procedures specified in Section 01 7700.
 - 2. Owner's written acceptance of the completed Work.
- D. Final Payment shall be made 31 days following Owner's written acceptance of the completed Work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 2100
ALLOWANCES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cash allowances.
- B. Payment and modification procedures relating to allowances.

1.02 RELATED REQUIREMENTS

- A. Section 01 2000 - Price and Payment Procedures: Additional payment and modification procedures.

1.03 CASH ALLOWANCES

- A. Costs Included in Cash Allowances: Cost of product to Contractor or subcontractor, less applicable trade discounts.
- B. Costs Not Included in Cash Allowances: Product handling at the site, including unloading, uncrating, and storage; protection of products from elements and from damage; and labor for installation and finishing.
- C. Architect Responsibilities:
 - 1. Consult with Contractor for consideration and selection of products, suppliers, and installers.
 - 2. Select products in consultation with Owner and transmit decision to Contractor.
 - 3. Prepare Change Order.
- D. Contractor Responsibilities:
 - 1. Assist Architect in selection of products, suppliers, and installers.
 - 2. Obtain proposals from suppliers and installers and offer recommendations.
 - 3. On notification of which products have been selected, execute purchase agreement with designated supplier and installer.
 - 4. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
 - 5. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.
- E. Differences in costs will be adjusted by Change Order.

1.04 CONTINGENCY ALLOWANCE

- A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.
- B. Funds will be drawn from the Contingency Allowance only by Change Order.
- C. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.05 ALLOWANCES SCHEDULE

- A. Contingency Allowance: Include the stipulated sum/price of \$100,000 for use upon Owner's instructions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 2300
ALTERNATES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Description of Alternates.
- B. Procedures for pricing Alternates.
- C. Documentation of changes to Contract Sum and Contract Time.

1.02 RELATED REQUIREMENTS

- A. Document 00 2113 - Instructions to Bidders: Instructions for preparation of pricing for Alternates.

1.03 ACCEPTANCE OF ALTERNATES

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.
- B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.04 SCHEDULE OF ALTERNATES

- A. Alternate No. 1 (ADD or DEDUCT) - Cast Underlayment
 - 1. Base Bid: Acoustic and wood underlayment assembly as detailed and specified in Section 06 1000.
 - 2. Alternate Bid: Cast underlayment system as specified in Section 03 5400.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General administrative requirements.
- B. Electronic document submittal service.
- C. Preconstruction meeting.
- D. Progress meetings.
- E. Construction progress schedule.
- F. Coordination drawings.
- G. Submittals for review, information, and project closeout.
- H. Number of copies of submittals.
- I. Requests for Information (RFI) procedures.
- J. Submittal procedures.
- K. Release of CAD/BIM files.

1.02 RELATED REQUIREMENTS

- A. Section 00 7200 - General Conditions: Dates for applications for payment.
- B. Section 01 6000 - Product Requirements: General product requirements.
- C. Section 01 7300 - Execution Requirements: Additional coordination requirements.
- D. Section 01 7700 - Closeout Procedures: Project record documents; operation and maintenance data; warranties and bonds.

1.03 DEFINITIONS

- A. Construction Submittals for Review: Submittals required by individual specification Sections relating to a portion of the Work which must be acted upon by the Architect before Work on that portion begins. Note that Construction Submittals are NOT Contract Documents. Submittals containing information different from requirements in the Contract Documents do not affect or modify the Contract unless and until a Change Order is properly issued.
 - 1. Shop Drawings: Drawings, diagrams, illustrations, and schedules specially prepared by the Contractor to illustrate some portion of the Work more clearly and in greater detail.
 - 2. Coordination Drawings: Drawings prepared by the Contractor to show how multiple-system and interdisciplinary work will be coordinated to avoid conflicts resulting from available space requirements.
 - 3. Product Data: 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
 - 4. Samples: Physical examples of products, materials, equipment, or workmanship that illustrate functional and aesthetic characteristics. Samples are used to establish the standards by which the Work will be judged.
- B. Construction Submittals for Information: Transmit for Architect's knowledge as Contract Administrator or for Owner. No action will be taken.
 - 1. Design Data: Performance requirements and material characteristics providing the basis for portions of the Work designed by the Contractor.
 - 2. Documentation required by individual specification Sections, such as:
 - a. Certificates.
 - b. Test reports.
 - c. Inspection reports.
 - d. Manufacturer's instructions.
 - e. Manufacturer's field reports.

3. Other types indicated.
- C. Mock-ups: Full-size assemblies for review of construction, coordination, testing, or operation; mock-ups are not Samples.

1.04 PROJECT COORDINATOR

- A. Project Coordinator: General Contractor.
- B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for site and building access, traffic, and parking facilities.
- C. During construction, coordinate use of site and facilities through the Project Coordinator.
- D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities. Responsibility for providing temporary utilities and construction facilities is identified in Section 01 1000 - Summary.
- F. Coordinate field engineering and layout work under instructions of the Project Coordinator.
- G. Make the following types of submittals to Architect through the Project Coordinator:
 1. Requests for Information.
 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.

1.05 COORDINATION REQUIREMENTS

- A. Coordinate construction operations included in various specification Sections 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 with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. If necessary, 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.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative procedures 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. Electronic project management software.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
- E. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
1. Indicate relationship of components shown on separate Shop Drawings.
 2. Indicate required installation sequences.

1.06 ARCHITECT'S DIGITAL DRAWINGS

- A. Digital files of the "architectural, mechanical, and electrical design models" are available from the Architect for the expressed use by the Contractor, and designated subcontractors and suppliers, in the construction of the Work and the preparation of Shop Drawings.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via Internet-based submittal service.
1. The web-based software will provide status logs, reports, searching and automated notifications.
 2. Besides submittals for review, information, and closeout, this procedure applies to Requests for Information (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
 3. Contractor and Architect are required to use this service.
 4. It is Contractor's responsibility to submit documents in allowable format.
 5. Subcontractors, suppliers, and Architect's consultants are to be permitted to use the service at no extra charge.
 6. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
 7. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
 8. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts, which shall be delivered by mail or courier.
- B. Architect review comments will be made available on the electronic document submittal service website for downloading. Contractor will receive e-mail notice of completed review.
- C. Distribution of reviewed and approved submittals to subcontractors and suppliers is the responsibility of the Contractor.
- D. Contractor may receive submittal information from subcontractors and suppliers via any of the following options:
1. Electronic (PDF) submittals provided to the Contractor via the electronic document submittal service website.
 2. Electronic (PDF) submittals provided to the Contractor via e-mail.
 3. Paper submittals provided by subcontractors and suppliers shall be forwarded to a Scanning Service for electronic scanning and conversion to PDF format.

- E. Cost: The cost of the service is to be paid by Contractor; include the cost of the service in the Contract Sum.
- F. Submittal Service: Use one of the following:
 - 1. Submittal Exchange (tel: 1-800-714-0024): www.submittalexchange.com/#sle.
 - 2. Newforma Project Cloud: www.newformaprojectcloud.com; 800-303-4650; projectcloud@newforma.com
 - 3. ProCore.
- G. Project Closeout: Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

3.02 RELEASE OF CAD/BIM FILES

- A. Contractors may request plans for their use/benefit for assistance in preparing submittals or for use in construction.
 - 1. The Revit model will be provided at no charge.
 - 2. If CAD files, contractor shall identify specific sheets to be produced as files.
 - 3. A signed release form is required.

3.03 PRECONSTRUCTION MEETING

- A. Project Coordinator will schedule a meeting after Notice of Award.
- B. Attendance Required:
 - 1. Owner's Representative
 - 2. Architect and their consultants
 - 3. Contractor's Project Manager and Superintendent.
 - 4. Major subcontractors.
 - 5. Manufacturers, suppliers, and other concerned parties as necessary.
- C. Agenda:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Distribution of Contract Documents.
 - 4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
 - 5. Designation of personnel representing the parties to Contract, the Owner's Representative and Architect.
 - 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 - 7. Scheduling and critical work sequencing.
 - 8. Use of premises by Owner and Contractor.
 - 9. Owner's requirements and occupancy prior to completion.
 - 10. Construction facilities and controls provided by Owner.
 - 11. Temporary utilities provided Owner.
 - 12. Survey and building layout.
 - 13. Security and housekeeping procedures.
 - 14. Application for payment procedures.
 - 15. Procedures for testing.
 - 16. Procedures for maintaining record documents.
 - 17. Requirements for start-up of equipment.
 - 18. Inspection and acceptance of equipment put into service during construction period.
- D. Project Coordinator will record minutes and distribute copies within 7 days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.
 - 1. Minutes will be distributed through email or Web-based project management software system.

3.04 PROGRESS MEETINGS

- A. Project Coordinator will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- B. Attendance Required:
 - 1. Contractor.
 - 2. Owner.
 - 3. Architect, at frequency per Owner-Architect agreement.
 - 4. Contractor's superintendent.
 - 5. Major subcontractors.
 - 6. Major Suppliers.
 - 7. Additional consultants, subcontractors, suppliers and product representatives as appropriate to agenda topics for each meeting.
- 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 off-site fabrication and delivery schedules.
 - 7. Maintenance of progress schedule.
 - 8. Corrective measures to regain projected schedules.
 - 9. Planned progress during succeeding work period.
 - 10. Coordination of projected progress.
 - 11. Maintenance of quality and work standards.
 - 12. Effect of proposed changes on progress schedule and coordination.
 - 13. Other business relating to work.
- D. Project Coordinator will record minutes and distribute copies within 5 days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.
 - 1. Minutes will be distributed through email or Web based project management software system

3.05 CONSTRUCTION PROGRESS SCHEDULE

- A. Within 15 days after date established in Notice to Proceed, submit preliminary schedule defining planned operations for the first 30 days of work, with a general outline for remainder of work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. 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.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.
- F. Incorporate the following schedule for contract closeout:
 - 1. Closeout Meeting: Schedule at least 45 days prior to anticipated date of Substantial Completion. Submit initial copy of Operation and Maintenance Manuals for review.
 - 2. Demonstration and Instruction: Schedule at least 15 days prior to Substantial Completion.
 - 3. Contractor's Punchlist and Request for Substantial Completion Inspection: Submit at least 10 days prior to anticipated date of Substantial Completion.
 - a. Architect will conduct inspection of Work within 5 days of receipt of Contractor's Request.
 - 4. Architect will issue "Certificate of Substantial Completion" in accordance with provisions in the Conditions of the Contract.

5. Closeout Submittals: See Section 01 7700 - Closeout Procedures.
6. Final Change Order: Architect will prepare and issue within 5 days after Substantial Completion.
7. Contractor's Certificate of Final Completion: Architect will conduct Final Inspection of the Work within 5 days of receipt of Contractor's Certificate.
8. Architect will issue Final Certificate for Payment within 5 days of completing satisfactory Final Inspection.
9. Owner's written acceptance of the completed Work and Final Payment: See Section 01 2000 - Price and Payment Procedures.

3.06 COORDINATION DRAWINGS

- A. Provide information required by Project Coordinator for preparation of coordination drawings.
- B. Review drawings prior to submission to Architect.

3.07 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 subcontractors and/or materials suppliers.
 - b. Do not forward requests which solely require internal coordination between subcontractors.
 2. Prepare using software provided by the Electronic Document Submittal Service (if used).
 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 6000 - 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 Architect, 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, Architect's, 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: Architect 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 Architect 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.

3.08 CONSTRUCTION SUBMITTALS: SEE SECTION 01 3300

3.09 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 7700 - 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.

3.10 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.
 1. Transmit via Electronic Document Submittal Service.
- B. Extra Copies at Project Closeout: See Section 01 7700.
- C. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
 1. After review, produce duplicates needed for on-site work.
 2. Retained samples will not be returned to Contractor unless specifically so stated.

END OF SECTION

SECTION 01 3233
PHOTOGRAPHIC DOCUMENTATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction photographs.
 - 3. Final completion construction photographs.
- B. Related Requirements:
 - 1. Section 01 3591 - Historic Treatment Procedures
 - 2. Section 01 7700 - Closeout Procedures for submitting photographic documentation as Project Record Documents at Project closeout.
 - 3. Section 02 4100 - Demolition: coordination of photographic documentation before selective demolition operations commence.
 - 4. Section 09 0166 - Maintenance of Marble
 - 5. Section 09 0190 - Maintenance of Finishes: specific requirements for stripping and repainting of decorative paint finishes.

1.02 INFORMATIONAL SUBMITTALS

- A. Key Plan: Submit key plan of Project work area with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files within seven days of taking photographs.
 - 1. Submit photos on CD-ROM or thumb-drive, or via submittal service. Include copy of key plan indicating each photograph's location and direction.
 - 2. Identification: Provide the following information with each image description in file metadata tag:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Date photograph was taken.
 - f. Description of location, vantage point, and direction.
 - g. Unique sequential identifier keyed to accompanying key plan.

1.03 FORMATS AND MEDIA

- A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels, and with vibration-reduction technology. Use flash in low light levels or backlit conditions.
- B. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
- C. Metadata: Record accurate date and time from camera.
- D. File Names: Name media files with date Project area and sequential numbering suffix.

1.04 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs with maximum depth of field and in focus.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Preconstruction Photographs: Before commencement of demolition, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points.

1. Take photographs to show existing conditions adjacent to property before starting the Work.
- C. Periodic Construction Photographs: Take photographs weekly. Select vantage points to show status of construction and progress since last photographs were taken.
 1. Interior Work, through date of Substantial Completion.
- D. Final Completion Construction Photographs: Take “after” photographs matching the historical “before” photographs after date of Substantial Completion for submission as Project Record Documents.
- E. Additional Photographs: Architect may request photographs in addition to periodic photographs specified.
 1. Three days' notice will be given, where feasible.
 2. In emergency situations, take additional photographs within 24 hours of request.
 3. Circumstances that could require additional photographs include, but are not limited to, the following:
 - a. Immediate follow-up when on-site events result in construction damage or losses.
 - b. Substantial Completion of a major phase or component of the Work.
 - c. Extra record photographs at time of final acceptance.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

**SECTION 01 3300
CONSTRUCTION SUBMITTALS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Construction submittals for review and information.
- B. Preparation and transmittal of construction submittals.
- C. Contractor's review and Architect's approval of construction submittals.

1.02 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: Processing submittals.
- B. Section 01 7700 - Closeout Procedures: Closeout submittals.
- C. Section 01 7823 - Operation and Maintenance Data: Preparation of Operation and Maintenance Manuals.

1.03 DEFINITIONS

- A. Construction Submittals for Review: Submittals required by individual specification Sections relating to a portion of the Work which must be acted upon by the Architect before Work on that portion begins. Note that Construction Submittals are NOT Contract Documents. Submittals containing information different from requirements in the Contract Documents do not affect or modify the Contract unless and until a Change Order is properly issued.
 - 1. Shop Drawings: Drawings, diagrams, illustrations, and schedules specially prepared by the Contractor to illustrate some portion of the Work more clearly and in greater detail.
 - 2. Coordination Drawings: Drawings prepared by the Contractor to show how multiple-system and interdisciplinary work will be coordinated to avoid conflicts resulting from available space requirements.
 - 3. Product Data: 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
 - 4. Samples: Physical examples of products, materials, equipment, or workmanship that illustrate functional and aesthetic characteristics. Samples are used to establish the standards by which the Work will be judged.
- B. Construction Submittals for Information: Transmit for Architect's knowledge as Contract Administrator or for Owner. No action will be taken.
 - 1. Design Data: Performance requirements and material characteristics providing the basis for portions of the Work designed by the Contractor.
 - 2. Documentation required by individual specification Sections, such as:
 - a. Certificates.
 - b. Test reports.
 - c. Inspection reports.
 - d. Manufacturer's instructions.
 - e. Manufacturer's field reports.
 - f. Safety Data Sheets (SDS).
 - 3. Other types indicated.
- C. Mock-ups: Full-size assemblies for review of construction, coordination, testing, or operation; mock-ups are not Samples.

1.04 RESPONSIBILITIES OF THE PARTICIPANTS

- A. Construction Manager:
 - 1. Read and understand the Contract Documents.
 - 2. Establish a realistic submittal schedule that allows for resubmittal.
 - 3. Coordinate submittals.

4. Review submittals for compliance with Contract Documents, site conditions, dimensions, coordination requirements, and construction means and methods; indicate any part of the submittal that does not conform to the requirements of the Contract Documents.
 5. Review submittals prior to transmitting them to Architect.
 6. Distribute approved submittals to Prime Contractors and others.
 7. Maintain copies of Safety Data Sheets (SDS) documentation on Project site in an accessible manual or book for reference and emergency response as needed.
- B. Contractor:
1. Read and understand the Contract Documents.
 2. Establish a realistic submittal schedule that allows for resubmittal.
 3. Coordinate submittals.
 4. Review submittals for compliance with Contract Documents, site conditions, dimensions, coordination requirements, and construction means and methods; indicate any part of the submittal that does not conform to the requirements of the Contract Documents.
 5. Review and approve submittals prior to transmitting them to Construction Manager.
 6. Review and approve submittals prior to transmitting them to Architect.
 7. Distribute approved submittals to subcontractors and others.
 8. Maintain copies of approved submittals at the jobsite for reference, and retain copy of approved submittals for the Owner's record.
 9. Maintain copies of Safety Data Sheets (SDS) documentation on Project site in an accessible manual or book for reference and emergency response as needed.
 10. Maintain submittal log and track progress.
- C. Subcontractors and Suppliers:
1. Read and understand the Contract Documents.
 2. Properly prepare complete and accurate submittals with extraneous information deleted.
 3. Submit in a timely manner based on Contractor's submittal schedule, construction schedule, and allow adequate time for Contractor and Architect reviews.
 4. Maintain records and current status.
- D. Architect:
1. Read and understand the Contract Documents.
 2. Verify that the Contractor has reviewed and approved submittals.
 3. Review submittals for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.
 4. Review submittals with reasonable promptness in accordance with Contractor's submittal schedule or take other appropriate action.
 5. Forward submittals to consultants.
 6. Maintain a copy of approved submittals and forward a copy to the Owner upon request.
 7. Maintain a submittal log and track progress.
- E. Owner:
1. Read and understand the Contract Documents.
 2. Coordinate Owner-furnished items installed by the Contractor.
 3. Coordinate Owner-provided items with the Contractor.
 4. Coordinate Contractor-furnished items to be installed by the Owner or under a separate contract.
 5. Coordinate work to be completed under a separate contract.
 6. Follow project requirements.

1.05 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 3. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- B. Submittals Schedule: Schedule submittals to expedite the Project, and coordinate submission of related items. Arrange the following information in a tabular format:
1. Scheduled date for first submittal.
 2. Specification Section number and title.
 3. Submittal category (action or informational).
 4. Name of subcontractor.
 5. Description of the Work covered.
 6. Scheduled date for Architect's final release or approval.
- C. Preparation: Submit submittals schedule, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
1. Options: Identify options requiring selection by the Architect.
 2. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.
- D. Initial Review of Submittals: Allow 15 days for review by Architect, excluding delivery time to and from the Contractor.
1. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.
- E. Review of Resubmittals: Allow 15 days for review by Architect for each resubmittal.
- F. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit adequate processing as described above.

PART 2 PRODUCTS

2.01 PRODUCT DATA SUBMITTALS

- A. Product Data: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
- B. Include the following information, as applicable:
1. Manufacturer's written recommendations.
 2. Manufacturer's product specifications.
 3. Manufacturer's installation instructions.
 4. Standard color charts.
 5. Manufacturer's catalog cuts.
 6. Wiring diagrams showing factory-installed wiring.
 7. Printed performance curves.
 8. Operational range diagrams.
 9. Mill reports.
 10. Standard product operating and maintenance manuals.
 11. Compliance with recognized trade association standards.
 12. Compliance with recognized testing agency standards.
 13. Application of testing agency labels and seals.
 14. Notation of coordination requirements.
 15. Certification that products are appropriate for installation indicated.

2.02 SHOP DRAWINGS SUBMITTALS

- A. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- B. Preparation: Include the following information, as applicable:
 - 1. Dimensions.
 - 2. Identification of products.
 - 3. Fabrication and installation drawings.
 - 4. Roughing-in and setting diagrams.
 - 5. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - 6. Shopwork manufacturing instructions.
 - 7. Templates and patterns.
 - 8. Schedules.
 - 9. Design calculations.
 - 10. Compliance with specified standards.
 - 11. Notation of coordination requirements.
 - 12. Notation of dimensions established by field measurement.
- C. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

2.03 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
- B. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- C. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.
- D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.
- F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.
- G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.
- H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
- I. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements.
- J. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- K. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during

installation of product or after product is installed in its final location, for compliance with requirements.

- L. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- M. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- N. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 01 Section "Closeout Procedures".
- O. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- P. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
 - 1. Preparation of substrates.
 - 2. Required substrate tolerances.
 - 3. Sequence of installation or erection.
 - 4. Required installation tolerances.
 - 5. Required adjustments.
 - 6. Recommendations for cleaning and protection.
- Q. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
 - 1. Name, address, and telephone number of factory-authorized service representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Statement that products at Project site comply with requirements.
 - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 6. Statement whether conditions, products, and installation will affect warranty.
 - 7. Other required items indicated in individual Specification Sections.
- R. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- S. Industry Standards: Where other Sections of the Specifications require that a product, material, or installation complies with specified industry standard, submit copies of standards at same time as submittal of other specified submittals.

1. Submit copies of reference standards specified such as ASTM, UL, FM, ANSI, ETC., for each material or installation of material specified.
2. Submit copies of trade association standards specified such as NRCA, BIA, AWI, SMACNA, ETC., for each material, process fabrication, or installation specified.

2.04 SAMPLE SUBMITTALS

- A. Samples: Prepare physical examples of products, materials, equipment, or workmanship specifically for this Project, including the following:
 1. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 2. Samples for Verification Purposes: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected.
- B. Samples include, but are not limited to, the following:
 1. Partial sections of manufactured or fabricated components.
 2. Small cuts or containers of materials.
 3. Complete units of repetitively used materials.
 4. Swatches showing color, texture, and pattern.
 5. Color range sets.
 6. Components used for independent testing and inspection.
 7. Integral parts and attachment devices.
- C. Submittals requiring Color and Finish Selections:
 1. As soon as practical, Contractor shall secure and submit color charts, finish samples, and other information for items requiring a color or finish selection.
 2. Color or finish selections will not be made until all color charts, finish samples, and other information for items requiring a color or finish selection have been submitted to the Architect and reviewed with the Owner.
 3. Contractor shall advise Architect of any deadlines for color or finish selections that may be necessary to ensure delivery of materials on schedule.
 4. As soon as practical after the color submittals have been received, the Architect will supply the Contractor with a master Color Schedule for the Project.
- D. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect's sample where so indicated. Attach label on unexposed side that includes the following:
 1. Generic description of Sample.
 2. Product name or name of manufacturer.
 3. Sample source.
- E. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
 1. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
- F. Number of Samples for Initial Selection: Submit 3 full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return two sample submittals with options selected.
- G. Number of Samples for Verification Purposes: If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least 3 sets of paired units that show approximate limits of the variations. Architect will return two sample submittals with options selected.

- H. Disposition: Maintain sets of approved Samples at Project site, available for quality control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - 1. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - 2. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify that Product List is complete and accurate.
- B. Identify practical groups of submittals and prepare initial submittal schedule.

3.02 ELECTRONIC DOCUMENT SUBMITTAL SERVICE PROCEDURES

- A. Refer to Section 01 3000 for additional requirements.
- B. Transmit construction submittals to Architect using the electronic document submittal service.
- C. Architect review comments will be made available on the electronic document submittal service website for downloading. Contractor will receive e-mail notice of completed review.
- D. Distribution of reviewed and approved submittals to subcontractors and suppliers is the responsibility of the Contractor.
- E. Contractor may receive submittal information from subcontractors and suppliers via any of the following options:
 - 1. Electronic (PDF) submittals provided to the Contractor via the electronic document submittal service website.
 - 2. Electronic (PDF) submittals provided to the Contractor via e-mail.
 - 3. Paper submittals provided by subcontractors and suppliers shall be forwarded to a Scanning Service for electronic scanning and conversion to PDF format.

3.03 PROCESSING SUBMITTALS

- A. Refer to Section 01 3000 for additional requirements.
- B. Attach a copy of the Project Transmittal Form to all submittals.
- C. Group submittals related to building elements or systems together for transmittal in accordance with submittal schedule.
- D. Only specified submittals will be processed by the Architect.

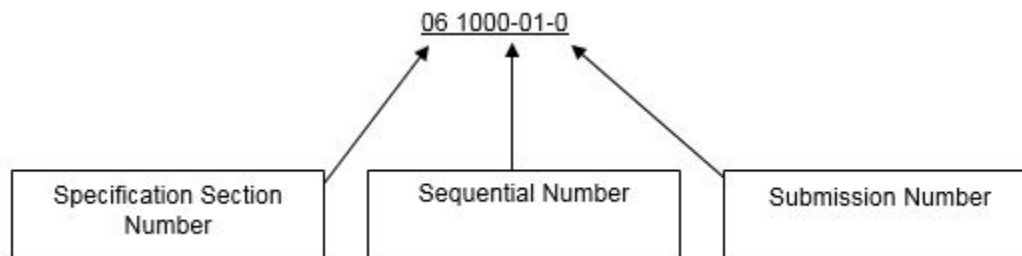
3.04 SUBMITTAL PREPARATION

- A. To aid in tracking and filing, each submittal shall contain the following identifying information:
 - 1. Project name and project number.
 - 2. Date submitted.
 - 3. Description of the item submitted.
 - 4. Unique submittal identifier, to include the specification Section reference number, consecutive submittal number, and resubmittal number, as applicable. The numbering system shall be retained throughout all resubmittals. Use the following format:

6-Digit Specification Section Number: Section number where submittal is specified.

2-Digit Sequential Number: Submittal sequential number, beginning with "01," for each submittal transmitted to Architect for each Section.

1-Digit Submission Number: Use "0" for initial submittal, "1" for first resubmittal, "2" for second resubmittal, and so forth.



- B. Apply Contractor's stamp, signed or initialed certifying that review, 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. The purpose of the submittal shall be one of the following:
 - 1. For review.
 - 2. For information only.
 - 3. Resubmittal.
- C. When revised for resubmittal, identify all changes made since previous submittal.
- D. Provide space for Architect's submittal review stamp.

3.05 SUBMITTAL REVIEW

- A. Only submittals which have been reviewed and stamped by the Contractor shall be forwarded to the Architect. When the Contractor determines that submittals do not meet contract requirements, return them to the originator for correction or modification as appropriate.
- B. The purpose of the Architect's review of submittals is for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. Architect's acceptance of Product Data, Shop Drawings, or Samples which deviates from the Contract Documents does not authorize changes to the Contract Sum. Submit in writing at the time of submission any changes to the Contract Sum affected by such Product Data, Shop Drawings, or Samples, otherwise, claim for extras will not be considered.
- C. Upon review by the Architect, the submittal shall be stamped with the status of the review as:
 - 1. No Exceptions Taken
 - 2. Reviewed as Noted
 - 3. Reviewed as Noted - Partial Resubmittal Required
 - 4. Reviewed as Noted - Complete Resubmittal Required
 - 5. See Consultant's Review
 - 6. See Consultant's Review - Resubmittal Required
 - 7. No Action Taken
- D. Final But Restricted Release: When submittals are marked "Reviewed as Noted," the Work covered by the submittal may proceed provided it complies with both the Architect's notations and corrections on the submittal and requirements of the Contract Documents. Final acceptance will depend on that compliance.
- E. Resubmittal Required: When submittal is marked "Partial Resubmitted Required" or "Complete Resubmittal Required," do not proceed with the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the Architect's notations. Resubmit without delay. Repeat if necessary to obtain a different action mark.
- F. Do not permit submittals marked "Resubmittal Required" to be used at the Project site, or elsewhere where construction is in progress.
- G. Other Action: Where a submittal is primarily for information or record purposes, or for special processing or other Contractor activity, the submittal will be returned, marked "No Action Taken".

H. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

END OF SECTION

SECTION 01 3591
HISTORIC TREATMENT PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes general protection and treatment procedures for the entire building.

1.02 RELATED REQUIREMENTS:

- A. Section 01 3233 - Photographic Documentation
- B. Section 09 0166 - Maintenance of Marble
- C. Section 09 0190 - Maintenance of Finishes: specific requirements for stripping and repainting of decorative paint finishes.

1.03 REFERENCES

- A. The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings. Washington D.C.: National Park Service, 1995. 5 August 2009.

1.04 DEFINITIONS

- A. Consolidate: To strengthen loose or deteriorated materials in place.
- B. Dismantle: To disassemble and detach items by hand from existing construction to the limits indicated, using small hand tools and small one-hand power tools, so as to protect nearby historic surfaces; and legally dispose of dismantled items off-site, unless indicated to be salvaged or reinstalled.
- C. Existing to Remain: Existing items that are not to be removed or dismantled.
- D. Historic: Spaces, areas, rooms, surfaces, materials, finishes, and overall appearance which are important to the successful rehabilitation and restoration as determined by Architect. Designated historic areas and surfaces are indicated on Drawings.
- E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.
- F. Reconstruct: To remove existing item, replicate damaged or missing components, and reinstall in original position.
- G. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.
- H. Reinstall: To protect removed or dismantled item, repair and clean it as indicated for reuse, and reinstall it in original position, or where indicated.
- I. Remove: Specifically for historic spaces, areas, rooms, and surfaces, the term means to detach an item from existing construction to the limits indicated, using hand tools and hand-operated power equipment, and legally dispose of it off-site, unless indicated to be salvaged or reinstalled.
- J. Repair: To correct damage and defects, retaining existing materials, features, and finishes while employing as little new material as possible. Includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.
- K. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.
- L. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.
- M. Reproduce: To fabricate a new item, accurate in detail to the original, and in either the same or a similar material as the original, unless otherwise indicated.
- N. Restore: To consolidate, replicate, reproduce, repair, and refinish as required to achieve the indicated results.
- O. Retain: To keep existing items that are not to be removed or dismantled.

- P. Reversible: New construction work, treatments, or processes that can be removed or undone in the future without damaging historic materials unless otherwise indicated.
- Q. Salvage: To protect removed or dismantled items and deliver them to Owner ready for reuse.
- R. Stabilize: To provide structural reinforcement of unsafe or deteriorated items while maintaining the essential form as it exists at present; also, to reestablish a weather-resistant enclosure.
- S. Strip: To remove existing finish down to base material unless otherwise indicated.

1.05 MATERIALS OWNERSHIP

- A. Historic items, relics, 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 encountered during removal and dismantling work remain Owner's property. Carefully dismantle and salvage each item or object.

1.06 INFORMATIONAL SUBMITTALS

- A. Preconstruction Documentation: Photograph pre-existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by Contractor's historic treatment operations.
- B. Fire-Prevention Plan: Submit before work begins.
- C. Inventory of Salvaged Items: After removal or dismantling work is complete, submit a list of items that have been salvaged.

1.07 QUALITY ASSURANCE

- A. Historic Treatment Program: Prepare a written plan for whole Project, including each phase or process and protection of surrounding materials during operations. Describe in detail materials, methods, and equipment to be used for each phase of work. Show compliance with indicated methods and procedures specified in this and other Sections.
 - 1. Dust and Noise Control: locations of proposed temporary dust- and noise-control partitions and means of egress from occupied areas coordinated with continuing on-site operations and other known work in progress.
 - 2. Debris Hauling: Include plans clearly marked to show debris hauling routes, turning radii, and locations and details of temporary protective barriers.
- B. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-prevention devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements.
- C. Regulatory Requirements: Comply with notification regulations of authorities having jurisdiction before beginning removal and dismantling work. Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Standards: Comply with ANSI/ASSE A10.6.

1.08 STORAGE AND PROTECTION OF HISTORIC MATERIALS

- A. Historic Materials for Reinstallation:
 - 1. Repair and clean historic items as indicated and to functional condition for reuse.
 - 2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label 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 unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make item functional for use indicated.
- B. Existing Historic Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after historic treatment and construction work in the vicinity is complete.

- C. Storage and Protection: When taken from their existing locations, catalog and store historic items within a weathertight enclosure where they are protected from wetting by rain, snow, condensation, or ground water, and from freezing temperatures.
 - 1. Identify each item with a nonpermanent mark to document its original location. Indicate original locations on plans elevations, sections, or photographs by annotating the identifying marks.
 - 2. Secure stored materials to protect from theft.

1.09 PROJECT CONDITIONS

- A. General Size Limitation in Historic Spaces: Materials, products, and equipment used for performing the Work and for transporting debris, materials, and products shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by 12 inches or more.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.
- D. 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 under a separate contract.
 - 2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.
 - a. In the case of asbestos, stop work in the area of potential hazard, shut off fans and other air handlers ventilating the area, and rope off area until the questionable material is identified. Re-assign workers to continue work in unaffected areas. Resume work in the area of concern after safe working conditions are verified.

PART 2 PRODUCTS - (NOT USED)

PART 3 EXECUTION

3.01 EXAMINATION

- A. Preparation for Removal and Dismantling: Examine construction to be removed or dismantled to determine best methods to safely and effectively perform removal and dismantling work. Examine adjacent work to determine what protective measures will be necessary. Make explorations, probes, and inquiries as necessary to determine condition of construction to be removed or dismantled and location of utilities and services to remain that may be hidden by construction that is to be removed or dismantled.
 - 1. Verify that affected utilities have been disconnected and capped.
 - 2. Inventory and record the condition of items to be removed and dismantled for reinstallation or salvage.
 - 3. Before removal or dismantling of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.
- B. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs and preconstruction digital recordings.
 - 1. Comply with requirements specified in Section 01 32 33 - Photographic Documentation.

3.02 PROTECTION, GENERAL

- A. Comply with temporary barrier requirements in Section 01 5000 - Temporary Facilities and Controls.
- B. Ensure that supervisory personnel are on-site and on duty when historic treatment work begins and during its progress.

- C. Temporary Protection of Historic Materials:
1. Protect existing historic materials with temporary protections and construction. Do not deface or remove existing materials.
 2. Do not attach temporary protection to historic surfaces except as indicated as part of the historic treatment program and approved by Architect.

END OF SECTION

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittals.
- B. References and standards.
- C. Control of installation.
- D. Mock-ups.
- E. Tolerances.
- F. Manufacturers' field services.
- G. Defect Assessment.

1.02 RELATED REQUIREMENTS

- A. Section 00 5000 - Contracting Forms and Supplements
- B. Section 00 7200 - General Conditions: Inspections and approvals required by public authorities.
- C. Section 00 7300 - Supplementary Conditions.
- D. Section 01 3000 - Administrative Requirements: Submittal procedures.
- E. Section 01 6000 - Product Requirements: Requirements for material and product quality.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Design Data: Submit for Architect's 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.
- C. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of test/inspection.
 - h. Date of test/inspection.
 - i. Results of test/inspection.
 - j. Compliance with Contract Documents.
 - k. When requested by Architect, provide interpretation of results.
 - 2. Test report submittals are for Architect's 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.
- D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
 - 1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 - 2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

1.04 REFERENCES AND STANDARDS

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Obtain copies of standards where required by product specification sections.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 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 Architect will use to judge the Work.
- C. Notify Architect and Architect's Consultant fifteen (15) working days in advance of dates and times when mock-ups will be constructed.
- D. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.
- E. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- F. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.
- G. Architect will use accepted mock-ups as a comparison standard for the remaining Work.

- H. Where mock-up has been accepted by Architect 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 Architect.
- I. Where possible 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 Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.05 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not complying with specified requirements.
- B. If, in the opinion of Architect, it is not practical to remove and replace the work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary utilities: Electricity, lighting, heat, ventilation.
- B. Temporary telecommunications services.
- C. Temporary sanitary facilities.
- D. Temporary Controls: Barriers, enclosures, and fencing.
- E. Security requirements.
- F. Vehicular access and parking.
- G. Waste removal facilities and services.
- H. Project identification sign.
- I. 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 GENERAL

- A. Install temporary facilities and utilities in conformance with State and Local Codes and requirements.
- B. Contractors to obtain and pay for required applications, permits and inspections.
- C. Early Service: Any Contractor requiring temporary service before it can be provided as specified, or whose requirements with respect to a particular service differ from the service specified shall provide such service as suits his needs, at his own expense, and in a manner satisfactory to the Construction Manager.
- D. Maintenance: Temporary facilities and utilities are to be maintained and kept in good operating condition. Maintenance men necessary to perform this work shall be provided in accordance with requirements. Maintenance time will include normal working hours for all trades and start up and shut down overtime as required.
- E. Removals: Subject to approval of Construction Manager, contractor providing temporary facilities or services shall remove same when no longer required or when their function is replaced by authorized use of permanent facilities. Other removal time may be directed by Construction Manager.
- F. Install temporary work in such a manner as not to interfere with the permanent construction.
- G. Disclaimer: Specific administrative and procedural minimum actions are specified in this section, as extension of provisions in General Conditions and other contract documents. These requirements have been included for special purposes as indicated. Nothing in this section is intended to limit types and amounts of temporary work required, and no omission from this section will be recognized as an indication by Architect, Engineer or Construction Manager that such temporary activity is not required for successful completion of the work and compliance with requirements of contract documents. Provisions of this section are applicable to, but not by way of limitation, utility services, construction facilities, security/protection provisions, and support facilities.
- H. Use of permanent systems and facilities:
 - 1. Obtain written agreement with Owner, establishing start of warranties and conditions of use:
 - a. Systems complete, with utility connections and safety devices.
 - b. Automatic controls operational.

- c. Temporary filters and items required for protection of equipment and finishes are in place.
- d. Replace items damaged during temporary service use.

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 ventilation required for construction purposes.
 - 1. Ventilation: The Mechanical Contractor shall provide ventilation for the building and to prevent building up of harmful dusts and fumes and to remove excess moisture. During warm weather, provide an adequate supply of fresh air (minimum 1 to 1-1/2 air changes per hour) when necessary to properly ventilate for moisture, dust, fumes from paints, cements, or adhesives in tightly enclosed area where natural ventilation will not be sufficient. Ventilation requirements may be supplemented by the building's permanent HVAC system but primary responsibility rests with the designated trade contractor.
 - 2. Mechanical Trade Contractor Responsibilities:
 - a. Maintain as to temperatures and ventilation required for work in various parts of the building as follows:
 - 1) Stored Materials: As recommended by manufacturer.
 - 2) Installed Materials: As recommended by manufacturer for the length of time following installation.
 - b. Maintain that portion of any floor thereof which has been constructed, or partly constructed, at a temperature and humidity that will ensure against damage due to warping, buckling, excessive shrinkage, etc., and adequate ventilation until the permanent HVAC system is operating. Trade Contractor will be responsible for damage to work under other contracts due to smoke or other damage caused by improper temporary heating.
 - c. Installation, connection, operation, and maintenance of temporary heating and ventilating devices to be performed by tradesmen proficient in the skills required and meet requirements of applicable regulator agencies.
 - d. Temperature Requirements:
 - 1) Provide temperatures required in various parts of the buildings as specified herein below:
 - 2) All Trades: provide the range of temperatures required for temporary heat, so the temperature as recommended by the manufacturer of the material concerned is maintained while such materials as mentioned above are stored in the building or being installed, and for the length of time recommended following installation. In those portions of the building where work is in progress or completed, it must be protected from freezing if subject to damage there from.
 - 3. During General Contract Work: Provide the following:
 - a. During installation of gypsum wallboard or gypsum lath, a temperature of not less than 55 deg F during working hours, and a temperature of at least 40 deg F at all other times throughout the heating season.
 - b. Wall before plaster work or joint work for gypsum wall board begins and continuous throughout setting and drying periods, a temperature range between 50 and 75 deg F shall be maintained day and night. During this period, no finish woodwork, resilient flooring or flexible wall coverings shall be installed or stored in the buildings, and no finish painting or applying of finish wall coatings shall be undertaken.
 - c. For a period of 10 days previous to the placing of interior wood finish and throughout the placing of this and other interior finishing, varnishing, painting, etc., and until final acceptance of the work or until fully occupied by the Owner, provide sufficient heat to produce a temperature of not less than 60 deg F.
 - 4. Permanent Systems:

- a. Ten days prior to setting millwork and/or wood doors and when approved by Architect, use and maintain the permanent HVAC system for heating, cooling and ventilation. The amount of time the permanent system will be used during the construction project should be at most four months. Maintenance shall include the following:
 - 1) Proper operation and maintenance of the HVAC plant until acceptance of building by Owner.
 - 2) Maintenance of temporary filters in all equipment to prevent accumulation of dust and dirt in coils, housing, and ductwork.
 - 3) Prior to Final Inspection: Replacement of all (temporary and existing) filters with new filters, thorough cleaning of coils and other equipment, putting entire system into first class condition, cleaning traps and devices, adjustment and renewal of all materials and equipment not functioning correctly.
 - 4) Use of permanent heating or cooling equipment for temporary heating or cooling shall not affect guarantee. Guarantee shall take effect at time of building acceptance by Owner. Mechanical contractor to provide extended warranty as needed.
 - b. Close off return air to the permanent systems and provide only single-pass air during the course of construction. This practice shall remain in place until area is clean and system is ready for final balancing.
 - c. Replace filters in all equipment to prevent accumulation of dust and dirt in coils, housings, and ductwork.
5. Prior to Final Inspection:
- a. Replace temporary filters with new filters.
 - b. Thoroughly clean coils and other equipment.
 - c. Clean traps and devices, adjust and renew any and all materials and equipment not functioning correctly.
 - d. Vacuum clean the duct system.
 - e. Restore equipment to like new condition.
- C. Existing facilities may be used.

1.05 TELECOMMUNICATIONS SERVICES

- A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
- B. Telecommunications services shall include:
 1. Windows-based personal computer dedicated to project telecommunications, with necessary software and laser printer.
 2. Internet Connections: Minimum of one; DSL modem or faster.

1.06 TEMPORARY SANITARY FACILITIES

- A. Use of existing facilities is permitted.
- B. Maintain daily in clean and sanitary condition.

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: Contractor's option.

- B. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.09 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:
- C. Provide all shoring and bracing required for safety and proper execution of the work. Remove the items when the work is completed.
- D. Paint surfaces exposed to view from Owner-occupied areas.
- E. Provide walk-off mats at access points into construction areas.

1.10 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.

1.11 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, Construction Manager and Owner.
- C. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.
- D. Provide and maintain access to fire hydrants, free of obstructions. Leave fire lanes and aisles to fire fighting equipment unobstructed at all times. Do not pile material in front of fire equipment, fire doors, or hydrants.
- E. Designated existing on-site roads may be used for construction traffic.
- F. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.
- G. Existing parking areas may be used for construction parking.
 - 1. Do not obstruct egress to and from parking areas unless authorized by Project Coordinator and/or Owner.
 - 2. On-site parking will be limited; two parking stalls and dumpster space will be designated for the contractor's use by the owner's representative.
- H. Parking of private vehicles of workers shall be in an area allocated by Project Coordinator and/or Owner.

1.12 WASTE REMOVAL

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition. Locate in area designated by Owner or Project Coordinator.
- B. Provide containers with lids. Remove trash from site periodically, legally disposing of waste materials, debris and rubbish off site and off Owner's property.
- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.
- E. Remove waste materials, debris, and rubbish from building daily.

- F. Carts, trucks, etc. used to transport materials shall be loaded in a safe manner. Materials shall not protrude beyond the sides of conveyance used.
- G. Materials shall not be thrown or dropped from scaffolds or other overhead areas.
- H. Gasoline or other highly flammable liquids shall not be brought inside facilities.

1.13 PROJECT IDENTIFICATION

- A. Provide project identification sign of design and construction indicated on drawings. If not indicated, propose design for Architect approval.
- B. Erect on site at location indicated and approved by Owner.
- C. No other signs are allowed without Owner permission except those required by law.

1.14 FIELD OFFICES

- A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture and drawing display table.
 - 1. Review proposed location within Project Site with Owner.
 - 2. Provide space for Project meetings, with table and chairs to accommodate 8 persons.
- B. Locate offices a minimum distance of 30 feet from existing and new structures.
- C. Field Offices shall be maintained until final acceptance and then be removed by the responsible party, no later than fifteen (15) days after acceptance of building, unless the Construction Manager orders or approves earlier removal.
- D. Expenses:
 - 1. Project Coordinator: All expenses in connection with his Field Offices, including the installation costs and use of telephones, heat, air-conditioning, light, water and janitor service shall be paid for by the Project Coordinator and will be fully reimbursed by the Owner.
 - 2. Contractors: All expenses associated with their offices including utility installation costs shall be included in their bid.
 - 3. Toll Costs: All long distance calls to be paid for by party placing call including Architect, Owner's representative, and contractors.
- E. Each Contractor: To keep a complete set of drawings, and specifications kept marked up to date with revision, Addenda, as-built drawings, and all permits and approved shop drawings on file.

1.15 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations.
- F. Procedures for Owner-supplied products.
- G. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Identification of Owner-supplied products.
- B. Section 01 6010 - Substitution Procedures: Substitutions made during procurement and/or construction phases.
- C. Section 01 6010.01 - Substitution Request Form
- D. Section 01 4000 - Quality Requirements: Product quality monitoring.
- E. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.

1.03 DEFINITIONS

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Products: Items that are demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
- C. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.
- D. Hazardous Substances Prohibited by Law: Including, but not limited to, any product, material, element, constituent, chemical, substance, compound, or mixture, which is defined in, included under, or regulated by any environmental laws.
- E. Environmental Laws: Applicable local, state, and federal laws, rules, ordinances, codes, regulations, and requirements in effect at the time Contractor's services are rendered.

1.04 SUBMITTALS

- A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

1. Submit within 15 days after date of Notice to Proceed.
 2. For products specified only by reference standards, list applicable reference standards.
- B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.
- E. Post-Bid Substitution Requests: See Section 01 6010 - Substitution Procedures

1.05 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products or materials for use on Project, product or material selected shall be compatible with products or materials previously selected, even if previously selected products or materials were also options.
- B. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two copies to the Architect.
1. Maintain one set of complete instructions at the job site during installation and until completion.
- C. Compliance: Contractor shall take whatever measures deemed necessary to ensure that all employees, suppliers, vendors, fabricators, subcontractors, or their assigns, to comply with hazardous substance requirements.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 3. Deliver products and materials to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
 5. Store products to allow for inspection and measurement of quantity or counting of units.
 6. Store products in a manner that will not endanger Project structure.
 7. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 8. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 9. Protect stored products from damage.

1.07 PRODUCT AND MATERIAL WARRANTIES

- A. General: Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

- B. General Warranty: Special warranties specified in each Section 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.
- C. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
 - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 - 2. Refer to Divisions 02 through 28 Sections for specific content requirements and particular requirements for submitting special warranties.
- D. Submittal Time: Comply with requirements in Section 01 7700 - Closeout Procedures.

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.

2.02 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. Use of products having any of the following characteristics is not permitted:
 - 1. Made using or containing CFC's or HCFC's.
 - 2. Made of wood from newly cut old growth timber.
 - 3. Containing lead, cadmium, or asbestos.
- C. 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 6116.
 - 2. If wet-applied, have lower VOC content, as defined in Section 01 6116.
 - 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 7419
 - 6. Are made of vegetable materials that are rapidly renewable.

2.03 PRODUCT SELECTIONS

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, that are new at time of installation.
 - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 - 2. If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 - 4. Where products are accompanied by the term "as selected," Architect will make selection.
 - 5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
 - 6. Products and materials brought onto the Project Site, and products and materials incorporated into the Work, shall comply with environmental laws.
- B. Descriptive Specification Requirements: Where Specifications describe a product, or assembly, listing exact characteristics required, without use of a brand or trade name, provide a product,

material or assembly that provides the characteristics and otherwise complies with Contract requirements.

- C. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements, and are recommended by the manufacturer for the application indicated. General overall performance of a product is implied where the product or material is specified for a specific application.
 - 1. Manufacturer's recommendations may be contained in published product literature, or by the manufacturer's certification of performance.
- D. Compliance with Standards, Codes, and Regulations: Where Specifications only require compliance with imposed code, standard, or regulation, select product that complies with standards, codes, or regulations specified.
- E. Visual Matching Specification: Where Specifications require matching an established sample, select a product (and manufacturer) that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches satisfactorily.
 - 1. If no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents on "substitutions" for selection of a matching product.
- F. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.
 - 1. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that does not include premium items.
 - 2. Custom Range: Where Specifications include the phrase "custom range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.
 - 3. Special Custom Range: Where Specifications include the phrase "special custom range of colors patterns, textures" or similar phrase, Architect will select a new color, pattern, or texture different from those normally produced by the manufacturer.

2.04 PRODUCT OPTIONS

- A. Basis of Design (Product Standard) Specification: Where a specific manufacturer's product is named and accompanied by the words "Basis of Design," including make or model number or other designation, it is intended to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.
- B. Other named manufacturers listed as "Acceptable Manufacturers" or "Other Acceptable Manufacturers" have been listed because they have implied compliance with requirements of the "Basis of Design" manufacturer and product. Listed "Acceptable Manufacturers" or "Other Acceptable Manufacturers" are not considered "Substitutions," and therefore, are not required to be submitted as such. However, costs, including professional service fees for changes or modifications to adjacent, contiguous, surrounding, supporting, or otherwise related areas, portions or parts of Project which are required to accommodate products and materials of "Acceptable Manufacturers" or "Other Acceptable Manufacturers" for complete, proper and functional installation, in lieu of specified "Basis of Design" manufacturer and product shall be borne or paid by Contractor.
- C. For products specified by naming several "Manufacturers" of "Acceptable Manufacturers", select one of the products or manufacturers named, which comply with the Contract Documents. Requests for manufacturer's products not listed must be submitted as "Substitutions."
- D. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- E. 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.

- F. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions:
Submit a request for substitution for any manufacturer not named.

2.05 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

- A. See Section 01 6010 - Substitution Procedures.

3.02 OWNER-SUPPLIED PRODUCTS

- A. See Section 01 1000 - Summary and Drawings 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 7419.
 - 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. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- F. For exterior storage of fabricated products, place on sloped supports above ground.
- G. Provide bonded 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.
- H. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- I. Comply with manufacturer's warranty conditions, if any.
- J. Do not store products directly on the ground.
- K. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- L. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- M. Prevent contact with material that may cause corrosion, discoloration, or staining.
- N. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- O. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

3.05 GENERAL INSTALLATION PROVISIONS

- A. Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- B. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- C. Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
- D. Recheck measurements and dimensions, before starting each installation.
- E. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible product or material as necessary to prevent deterioration.
- F. Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.
- G. Handle, install, connect, clean, condition, and adjust products and materials in accordance with manufacturer's instructions and in conformity with specified requirements.
 - 1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with manufacturer for further instructions.
 - 2. Do not proceed with work without clear instructions.
- H. Perform work in accordance with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.
- I. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

3.06 RESTRICTION OF HAZARDOUS SUBSTANCES

- A. Contractor agrees that it shall not knowingly after reasonable diligence and effort, incorporate into the Work any hazardous substance other than as may be lawfully contained within products, except in accordance with applicable environmental laws. Further, in performing any of its obligations hereunder, Contractor shall not cause any release of hazardous substances into, or contamination of, the environment, including soil, the atmosphere, any watercourse or ground water, except in accordance with applicable environmental laws. In the event that Contractor engages in any of the activities prohibited in this paragraph, to the fullest extent permitted by law, Contractor hereby indemnifies and holds harmless Owner and its partners, members, officers, directors, agents, employees and consultants from and against any and all claims, damages, losses, causes of action, suits and liabilities of every kind, including, but not limited to, expenses of litigation, court costs, punitive damages, and attorney's fees arising out of, incidental to or resulting from the activities prohibited.
- B. In the event Contractor observes on the Project Site any substance which Contractor reasonably believes to be a hazardous substance, and which is being introduced into the Work or exists on the Project Site in a manner violative of any applicable environmental laws, Contractor shall immediately notify Owner and report the condition to Owner in writing. The Work in the affected area shall not thereafter be resumed except by written authorization of Owner if in fact a hazardous substance has been encountered and has not been rendered harmless. In the event that Contractor fails to give Owner proper notification hereunder, upon knowingly observing a hazardous substance at the Project Site, to the fullest extent permitted by the law, Contractor hereby indemnifies and holds harmless Owner, and all of its partners, members, officers, directors, agents, employees and consultants from and against all claims, damages, losses, causes of action, suits and liabilities of every kind, including, but not limited to, expenses of litigation, court costs, punitive damages, and attorneys' fees arising out of, incidental to, or resulting from Contractor's failure to stop the Work.
- C. If Owner believes that hazardous substances may have been located, generated, manufactured, used, or disposed of on or about the Project Site by Contractor or any of its employees, agents, subcontractors, suppliers, or invitees, Owner may have environmental studies of the Project Site conducted as it deems appropriate, and Contractor shall be responsible for the cost of such studies to the extent that Contractor or any of its employees, agents, subcontractors, suppliers or invitees are responsible for the presence of any hazardous substances.

END OF SECTION

SECTION 01 6010
SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedural requirements for proposed substitutions.

1.02 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: Submittal procedures, coordination.
- B. Section 01 6000 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.
- C. Section 01 60 10.01 - Substitution Request Form

1.03 DEFINITIONS

- A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
 - 1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
 - 2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
 - a. Substitution Requests made after contract award and for the Contractor's convenience will be subject to review fees, and possibly redesign fees, by the design team. These will be processed as a deductive change order to the contractor and paid to the design team by the Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Bids shall be based upon providing specified materials, products, Acceptable Manufacturers, organizations, and applications; as identified in these Contract Documents.
- B. Contractor's requests for Post-Bid Substitution will only be received and considered by Architect when one or more of following conditions are satisfied, as determined by Architect; otherwise requests will be returned without action except to record noncompliance with these requirements:
 - 1. Specified product or method of construction cannot be provided within Contract Time. Request will not be considered if specified product or method cannot be provided as result of failure to pursue Work promptly or coordinate activities properly.
 - 2. Specified product or method of construction cannot receive necessary approval by governing authority, and requested substitution can be approved.
 - 3. Substantial advantage is offered to Owner, in terms of cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Additional responsibilities for Owner may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - 4. Specified product or method of construction cannot be provided in manner that is compatible with other materials, and where Contractor certifies that substitution will overcome incompatibility.
 - 5. Specified product or method of construction cannot be coordinated with other materials, and where Contractor certifies that proposed substitution can be coordinated.
 - 6. Specified product or method of construction cannot provide warranty required by Contract Documents and where Contractor certifies that proposed substitution provide required warranty.
- C. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:

1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
 2. Agrees to provide the same warranty for the substitution as for the specified product.
 3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
 4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
 5. Waives claims for additional costs or time extension that may subsequently become apparent.
 6. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.
- D. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
1. Note explicitly any non-compliant characteristics.
- E. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
1. Forms included in the Project Manual are adequate for this purpose, and must be used.
- F. Limit each request to a single proposed substitution item.
1. Submit an electronic document, combining the request form with supporting data into single document.

3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

- A. Submittal Time Restrictions:
- B. Submittal Form (before award of contract):
1. Submit substitution requests by completing the form provided in Section 016011. See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.

3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

- A. Submittal Form (after award of contract):
1. Submit substitution requests by completing the form provided in Section 01 60 10.01. See this section for additional information and instructions. Use only this form; other forms of submission are unacceptable.
- B. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
- C. Submit request for Substitution for Convenience immediately upon discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
1. Contractor is responsible for ensuring that the proposed substitution is of equal to or superior to the basis of design in performance, appearance, quality and function prior to Architect's review.
 2. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
 3. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
 4. Bear the costs engendered by proposed substitution of:
 - a. Owner's compensation to the Architect for any required redesign, time spent processing and evaluating the request. These will be processed as a deductive change order to the contractor and paid to the design team by the Owner.
 - b. Other construction by Owner.
 - c. Other unanticipated project considerations.
- D. Substitutions will not be considered under one or more of the following circumstances:

1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
2. Without a separate written request.
3. When acceptance will require revisions to Contract Documents.

3.04 RESOLUTION

- A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.
- B. Architect will notify Contractor in writing of decision to accept or reject request.
 1. Architect's decision following review of proposed substitution will be noted on the submitted form.

3.05 ACCEPTANCE

- A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

3.06 CLOSEOUT ACTIVITIES

- A. See Section 01 7700 - Closeout Submittals, for closeout submittals.
- B. Include completed Substitution Request Forms as part of the Project record.

END OF SECTION

**SECTION 01 6010.01
SUBSTITUTION REQUEST FORM**

We hereby submit for your consideration the following product instead of the specified item for the following project:

PROJECT TITLE _____ PROJECT NO. _____

DRAWING NO. _____ DRAWING TITLE _____

SPEC. SECTION	SPEC. TITLE	PARAGRAPH	SPECIFIED ITEM
_____	_____	_____	_____

Proposed Substitution: _____

Attach complete information on changes to Drawings and/or Specifications which proposed substitution will require for its proper installation.

Submit, with request, all necessary samples and substantiating data to prove equal quality and performance to that which is specified. Clearly mark manufacturer's literature to indicate equality in performance.

Substitutions of the materials and equipment described in the Contract Documents will be considered during the bidding period upon receipt or a written request to the Architect for approval up to ten (10) days before receipt of bids. Verbal or written requests without the completed Substitution Request Form will not be considered.

CERTIFICATION OF EQUAL PERFORMANCE AND ASSUMPTION OF LIABILITY FOR EQUAL PERFORMANCE

The undersigned states that the function, appearance, and quality are equivalent or superior to the specified item.

Submitted by:

Signature

Firm

Address

Telephone Email Date

Signature shall be by person having authority to legally bind his firm to the above terms. Failure to provide legally binding signature will result in retraction of approval.

Fill in Blanks Below:

- A. Does the substitution affect dimensions shown on Drawings? Yes No

If yes, clearly indicate changes:

- B. Will the undersigned pay for changes to the building design, including engineering and detailing costs caused by the requested substitution? Yes No

If no, fully explain:

C. What effect does substitution have on other Contracts or other trades?

D. What effect does substitution have on construction schedule?

E. Manufacturer's warranties of the proposed and specified items are:

_____ Same _____ Different (Explain on Attachment)

F. Reason for Request:

G. Itemized comparison of specified item(s) with the proposed substitution.

List significant variations:

H. Accurate cost data comparing proposed substitution with product specified:

I. Designation of maintenance services and sources:

(ATTACH ADDITIONAL SHEETS IF REQUIRED)

FOR USE BY DESIGN PROFESSIONAL:

_____ Recommended _____ Recommended as Noted

_____ Not Recommended _____ Received Too Late

Signed By _____

Date _____

FOR USE BY OWNER'S REPRESENTATIVE OR OWNER:

_____ Approved _____ Approved as Noted

_____ Not Approved _____ Approved Too Late

Signed By _____

Date _____

END OF SECTION

SECTION 01 6116

VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. VOC restrictions for product categories listed below under "DEFINITIONS."
- B. All products of each category that are installed in the project must comply; Owner's project goals do not allow for partial compliance.

1.02 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: Submittal procedures.
- B. Section 01 4000 - Quality Requirements: Procedures for testing and certifications.
- C. Section 01 6000 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

1.03 DEFINITIONS

- A. VOC-Restricted Products: All products of each of the following categories when installed or applied on-site in the building interior:
 - 1. Adhesives and sealants.
 - 2. Paints and coatings.
 - 3. Carpet Tile
 - 4. Composite Wood and Agrifiber Products
 - 5. Hard Surface Flooring Systems
 - 6. Ceiling and Wall Systems
- B. Interior of Building: Anywhere inside the exterior weather barrier.
- C. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.
- D. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.

1.04 REFERENCE STANDARDS

- A. CAL (CHPS LEM) - Low-Emitting Materials Product List; California Collaborative for High Performance Schools (CHPS).
- B. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers.
- C. CRI (GLP) - Green Label Plus Testing Program - Certified Products; www.carpet-rug.org.
- D. GreenSeal GS-36 - Adhesives for Commercial Use.
- E. GreenSeal GS-11 - Paints, 1st Edition, May 20, 1993.
- F. GreenSeal GC-03 - Anti-Corrosive Paints, 2nd edition, January 7, 1997.
- G. SCAQMD 1168 - Adhesive and Sealant Applications.
- H. SCAQMD 1113- South Coast Air Quality Management District Rule No.1168; January 1, 2004 rules.
- I. SCS (CPD) - SCS Certified Products.

1.05 SUBMITTALS

- A. See Section 01 3000 - 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. 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. All VOC-Restricted Products: Provide products having VOC content of types and volume not greater than those specified in State of California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions From Various Sources Using Small-Scale Environmental Chambers.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Current GREENGUARD Children & Schools certification; www.greenguard.org.
 - b. Current Carpet and Rug Institute Green Label Plus certification; www.carpet-rug.org.
 - c. Current SCS Floorscore certification; www.scs-certified.com.
 - d. Current SCS Indoor Advantage Gold certification; www.scs-certified.com.
 - e. Product listing in the CHPS Low-Emitting Materials Product List at www.chps.net/manual/lem_table.htm.
 - f. Current certification by any other agencies acceptable to CHPS.
 - g. Report of laboratory testing performed in accordance with CHPS requirements for getting a product listed in the Low-Emitting Materials Product List; report must include laboratory's statement that the product meets the specified criteria.
 - 2. Product data submittals showing VOC content are NOT acceptable forms of evidence.
 - 3. Exception: The product categories listed below are not required to comply with this requirement.
- C. Adhesives and Joint Sealants: Provide only products having volatile organic compound (VOC) content not greater than required by South Coast Air Quality Management District Rule No.1168.
 - 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. Certification by manufacturer that product complies with requirements.
- D. Aerosol Adhesives: Provide only products having volatile organic compound (VOC) content not greater than required by GreenSeal GS-36.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Current GreenSeal Certification.
 - b. Published product data showing compliance with requirements.
- E. Paints and Coatings:
 - 1. Provide coatings that comply with the most stringent requirements specified in the following:
 - a. VOC content limits established in Green Seal Standard GS-11, Paints, 1st Edition, May 20, 1993 for architectural paints and coatings.
 - b. VOC content limit established in Green Seal Standard GC-03, Anti-Corrosive Paints, 2nd Edition January 7, 1997 for Anti- corrosive and anti- rust paints.
 - c. VOC content limit established in SCAQMD Rule 1113, Architectural Coatings in effect January 1, 2004 for clear wood finishes, floor coatings, stains, primers, and shellacs.
 - 2. Determination of VOC Content: CAL (VOC) - Standard Practice for the Testing of Volatile Organic Emissions From Various Sources Using Small-Scale Environmental Chambers (including Addendum 2004-01); State of California Department of Health Services; 2004. exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
 - 3. Evidence of Compliance: Acceptable types of evidence are:
 - a. Report of laboratory testing performed in accordance with requirements.
- F. Carpet Tile and Adhesive: Provide products having VOC content not greater than that required for CRI Green Label Plus certification.

1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Current Green Label Plus Certification.
 - b. Report of laboratory testing performed in accordance with requirements.
- G. Composite Wood and Agrifiber Products and Adhesives Used for Laminating Them: Provide products having no added urea-formaldehyde resins.
 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Current SCS "No Added Urea Formaldehyde" certification; www.scs-certified.com.
 - b. Published product data showing compliance with requirements.
- H. Hard surface Flooring Systems including: Vinyl, linoleum, laminate flooring, wood flooring, ceramic flooring, rubber flooring and wall base.
 1. Provide systems certified as compliant with the FloorScore standard by an independent third party.
 2. Floor finishes such as sealer, stain, and finish must meet the standards of SCAQMD Rule 1113, Architectural Coatings, rules in effect January 1, 2004.
 3. Tile setting adhesives and grout must meet SCAQMD Rule 1168 July 1, 2005.
- I. Ceiling and Wall Systems
 1. Systems include all gypsum board, insulation, acoustical ceiling systems and wall coverings installed in the building interior
 2. Provide products that meet the testing and product requirements of CAL (VOC) - Standard Practice for the Testing of Volatile Organic Emissions From Various Sources Using Small-Scale Environmental Chambers (including Addendum 2004-01); State of California Department of Health Services; 2004.

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

SECTION 01 7300
EXECUTION REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Cutting and patching.
- C. Cleaning and protection.
- D. Starting of systems and equipment.

1.02 DEFINITIONS

- A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.03 RELATED SECTIONS

- A. Section 01 4000 - Quality Requirements: Testing and inspection procedures.
- B. Section 01 5000 - Temporary Facilities and Controls: Temporary exterior enclosures temporary interior partitions.
- C. Section 01 7700 - Closeout Procedures: Closeout procedures related to achieving Substantial Completion and Final Completion of the Work.
- D. Section 01 7823 - Operation and Maintenance Data: Preparing operation and maintenance manuals and obtaining warranties and bonds.
- E. Section 01 7900 - Demonstration and Training: Training Owner personnel in operation and maintenance of equipment and systems.
- F. Section 02 4100 - Demolition: Selective demolition of existing building and site elements.
- G. Individual Product Specification Sections: Advance notification to other Sections of openings required in work of those Sections.

1.04 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals for submittal procedures.
- B. Cutting and Patching: Submit written request in advance of cutting or alteration which affects:
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather exposed or moisture-resistant element.
 - 3. Efficiency, maintenance, or safety of any operational element.
 - 4. Visual qualities of sight exposed elements.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.05 PROJECT CONDITIONS

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Provide temporary facilities/systems for conditioning interior spaces as required by Work progress and the following:
 - 1. Curing of Concrete Slabs: Refer to Division 03 Sections for additional requirements.
 - a. Concrete slabs shall be properly cured and at least 45 days old before beginning aggressive drying.
 - b. Provide temporary climate control necessary to remove excess moisture and reduce emission rate to levels acceptable to finish flooring manufacturers.
 - c. During slab drying, maintain relative humidity below 40 percent with a humidity ratio below 30 grains per lb of air.

- d. Allow for moisture testing of the slab to be performed at least 60 days prior to installation of floor coverings to permit sufficient drying time should excessive moisture levels exist.
2. Temporary climate control necessary to maintain satisfactory conditions recommended by products manufacturers for proper installation, application and curing of specified products.
- C. 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.
- D. 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.

1.06 COORDINATION

- A. See Section 01 1000 - Summary for occupancy-related requirements.
- B. Coordinate scheduling, submittals, and work of the various Specification Sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.
- C. Notify affected utility companies and comply with their requirements.
- D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various Specification Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- E. Coordinate space requirements, supports, and installation of mechanical and electrical Work which are indicated diagrammatically on Drawings. Follow routing shown 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.
- F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- G. Coordinate completion and clean-up of work of separate Specification Sections.
- H. 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 Specification 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. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.
- D. Post-Bid Substitutions: For any proposed change in materials, submit request for post-bid substitutions as described in Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Start of Work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual Specification Sections.

- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of Work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. 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 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual Specification 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.

3.04 CUTTING AND PATCHING

- A. Execute cutting and patching to complete the Work, to uncover Work in order to install improperly sequenced Work, to remove and replace defective or non-conforming Work, to remove samples of installed Work for testing when requested, to provide openings in the Work for penetration of mechanical and electrical Work, to execute patching to complement adjacent Work, and to fit products together to integrate with other Work.
- B. Execute Work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.
- C. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- D. Cut rigid materials using masonry saw or core drill. Sawcut existing concrete, terrazzo, and masonry for clean straight lines. Pneumatic tools not allowed without prior approval.
- E. Restore Work with new products in accordance with requirements of Contract Documents.
- F. Fit Work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- G. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 8400 to full thickness of the penetrated element. Patch fire rated assemblies with materials to match existing and maintain assembly fire rating.
- H. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
- I. Make neat transitions. Patch work to match adjacent work in texture and appearance.
- J. Patch or replace surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching Work. Repair substrate prior to patching finish. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

- K. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - 1. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
- L. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
- M. Exterior Building Enclosure: Patch components in a manner that restores enclosure, including roof, to a weathertight condition.

3.05 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.

3.06 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 plastic coverings if possible.

3.07 STARTING SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect and owner seven days prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- G. When specified in individual Specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

- H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.08 DEMONSTRATION AND INSTRUCTION

- A. See Section 01 7900 - Demonstration and Training.

3.09 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.
- B. Testing, Adjusting, and Balancing HVAC Systems: See Section 23 0593.

3.10 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
 - 1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.
- B. Use cleaning materials that are nonhazardous.
- C. 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.
- 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, 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.

3.11 CLOSEOUT PROCEDURES

- A. Refer to Section 01 7700 - Closeout Procedures.
- B. Make submittals that are required by governing or other authorities.
 - 1. Provide copies to Architect, Construction Manager, and Owner.
- C. Notify Architect and Construction Manager when Work is considered ready for Substantial Completion.
- D. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect's and Construction Manager's review.
- E. Owner will occupy all of the building as specified in Section 01 1000 - Summary.
- F. Correct items of Work listed in executed Certificates of Substantial Completion and comply with requirements for access to Owner-occupied areas.
- G. Notify Architect and Construction Manager when Work is considered finally complete.
- H. Complete items of Work determined by Architect's and Construction Manager's final inspection.

3.12 MAINTENANCE SERVICE

- A. Furnish service and maintenance of components indicated in Specification Sections for one year from date of Substantial Completion.
- B. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- D. Maintenance service shall not be assigned or transferred to any agent or Subcontractor without prior written consent of the Owner.

END OF SECTION

**SECTION 01 7700
CLOSEOUT PROCEDURES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Contract closeout procedures related to:
 - 1. Substantial Completion of the Work and
 - 2. Final Completion and Owner's acceptance of the Work.
- B. Closeout submittals including:
 - 1. Substantial Completion documents.
 - 2. Final Completion documents:
 - a. Final Application for Payment with supporting documents.
 - b. Project Record Documents.
 - c. Warranties and Bonds.

1.02 RELATED SECTIONS

- A. General Conditions: Performance and Payment Bonds, warranty, and correction of Work.
- B. Section 00 6513 - Contractor's Request for Substantial Complete Inspection.
- C. Section 00 6515 - Contractor's Certificate of Final Completion.
- D. Section 01 3000 - Administrative Requirements: Submittal procedures for shop drawings, product data, and samples.
- E. Section 01 7823 - Operation and Maintenance Data: Preparation of O&M Manuals.
- F. Section 01 7900 - Demonstration and Training: Operation and maintenance instruction of Owner's personnel.
- G. Individual Specification Sections: Specific requirements for operation and maintenance data.
- H. Individual Specification Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

- A. Contractor's Declaration of Substantial Completion: Submit required forms and related documentation certifying that status of Work is consistent with "Substantial Completion". Refer to Section 00 6513.
- B. Operation and Maintenance Manuals: Provide 3 sets of revised documents in final form for use by Owner's personnel. Refer to Section 01 7823 for additional requirements.
- C. Material and Product Warranties: Submit fully executed manufacturers' warranties within 10 days following Date of Substantial Completion, except as follows:
 - 1. For equipment and component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance; list date of acceptance as the beginning of the warranty period .
 - 2. For items of Work for which acceptance is delayed beyond date of Substantial Completion, submit within 10 days after acceptance; list date of acceptance as the beginning of the warranty period.
- D. Contractor's Statement of Final Completion: Submit required form certifying that Work has been fully completed; make submittal within 30 days after Date of Substantial Completion. Refer to Section 00 6515.
- E. Claim for Final Payment: Submit 3 copies of required final Application for Payment forms together with supporting documents.
- F. Evidence of Payments and Release of Liens: Submit 2 copies of required forms with claim for Final Payment.
- G. Project Record Documents: Submit required Record Documents with claim for Final Payment.
- H. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 COORDINATION

- A. Coordinate scheduling, submittals, and inspection of the work of the various sections of the Project Manual to ensure efficient and orderly closeout procedure, with provision for accommodating items installed later.
- B. Final Utility Connections: Notify affected utility companies and comply with their requirements for final connections.

1.05 PRE-SUBSTANTIAL COMPLETION MEETING

- A. Convene 30 days before submitting Declaration of Substantial Completion for purpose of reviewing required closeout procedures with representatives of Owner and Architect.

1.06 PROJECT CONDITIONS

- A. Coordinate completion and ensure clean-up of work of separate sections of the Project Manual.
- B. The Owner intends to occupy the entire project area at Date of Substantial Completion.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PREPARATION FOR SUBSTANTIAL COMPLETION

- A. Operation and Maintenance Manuals:
 - 1. Comply with additional requirements in Section 01 7823.
 - 2. Include operating instructions and maintenance data prepared by personnel experienced in maintenance and operation of described equipment and systems.
 - 3. Use Operating and Maintenance Manuals as reference for instruction of Owner's personnel.
- B. Demonstration and Training:
 - 1. Comply with additional requirements in Section 01 7900.
 - 2. Prior to Substantial Completion, perform demonstration and train Owner's personnel in proper operation and maintenance of equipment and systems designated in individual sections of the Project Manual.
- C. Preliminary Inspection for Substantial Completion:
 - 1. Schedule and conduct preliminary inspection of the Work accompanied by Owner's Project Representative.
 - a. Determine and identify items to be listed for correction and completion (punchlist) on Contractor's Declaration of Substantial Completion.
 - 2. Verify that surface finish materials are properly installed in accordance with manufacturer's recommendations and exposed surfaces are clean and free from damage.
 - 3. Verify final adjustment of operating items, equipment and system components to ensure smooth and unhindered operation.
 - 4. Verify specific operating and performance requirements described in individual specification sections.
 - a. Secure certification by TAB contractor that testing, adjusting and balancing work has been completed, and respective systems are performing in accordance with specified design requirements.
 - b. Replace filters of operating equipment.
 - 5. Verify that utility services are properly connected and of the correct characteristics.
 - 6. Verify inspection and acceptance of the respective portions of the Work by Authorities Having Jurisdiction (AHJ).

3.02 SUBSTANTIAL COMPLETION DOCUMENTS

- A. Contractor's Declaration of Substantial Completion:
 - 1. Provide the necessary assurance that the progress of the Work is consistent with Substantial Completion as defined by the Contract Documents.
 - 2. Prepare certificate included in Section 00 6513 and submit to Architect.

3. Upon receipt of the required forms the Architect will schedule and conduct a Substantial Completion Inspection.
- B. Certificate of Substantial Completion: Upon verification of Contractor's Punchlist, and subsequent determination by Architect that status of Work is suitable for occupancy by the Owner, the Architect will prepare Certificate of Substantial Completion (AIA Doc G704).
- C. Upon issuance of Certificate of Substantial Completion, Contractor may request payment of the contract retainage of five percent (5%) of the value of completed Work. This request shall be accompanied by a sworn statement from the Contractor that 10 calendar days prior to date of the request, known subcontractors, sub-subcontractors and suppliers received notice of the Contractor's intent. The Contractor shall release retained funds to subcontractors in the same manner as retained funds are released to the Contractor by the Owner.
 1. Payment will be withheld on the value of work not yet performed as of date of Substantial Completion. The retained amount shall be equal to two hundred percent (200%) of the actual value of labor and materials yet to be provided as determined by the Architect.
 2. Additional funds will be withheld equal to two hundred percent (200%) of the value of Chapter 573 claims currently on file.
- D. Complete and correct respective items of work listed and attached to the Certificate of Substantial Completion within 30 days following Date of Substantial Completion.

3.03 FINAL CLOSEOUT DOCUMENTS

- A. Contractor's Statement of Final Completion: Certify that the Work is complete and has been inspected and found to be in compliance with the Contract Documents. Prepare certificate included in Section 00 6515 and submit to Architect.
- B. Claim for Final Payment:
 1. Prepare application for payment on approved forms.
 2. Amount of final payment shall be the unpaid balance of the contract sum.
 3. Final payment shall be made 31 calendar days following date of Owner's written acceptance of the completed Work.
- C. Evidence of Payments and Release of Liens: Prepare the following:
 1. "Contractors Affidavit of Payment of Debts and Claims" (AIA Doc G706).
 2. "Contractor's Affidavit of Release of Liens" (AIA Doc G706A).
 - a. Include separate waivers of lien from subcontractors, suppliers, and others with lien rights against property of the Owner.
 3. Obtain "Consent of Surety to Final Payment" (AIA Doc G707).
- D. Project Record Documents:
 1. Submit one set of the following Record Documents; record actual revisions to the Work:
 - a. Drawings
 - b. Specifications
 - c. Addenda
 - d. Change Orders and other modifications to the Contract.
 - e. Reviewed shop drawings, product data, and samples.
 2. Ensure entries are complete and accurate, enabling future reference by the Owner.
 3. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 - a. Manufacturer's name and product model and number.
 - b. Product substitutions or alternates utilized.
 - c. Changes made by Addenda and modifications.
 4. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
 - a. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - b. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.

- c. Field changes of dimension and detail.
- d. Details not on original Contract Drawings.
- E. Material and Product Warranties:
 - 1. Obtain required warranties executed in duplicate by responsible subcontractors, suppliers and manufacturers, within ten 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.
 - 2. Verify that documents are in proper form, contain full information, and are notarized.
 - 3. Co-execute warranty documents when required.
 - 4. Retain warranties until time specified for submittal.
 - 5. Include photocopies of each in operation and maintenance manuals; indicate on Table of Contents.

3.04 FINAL INSPECTION OF THE WORK

- A. Following submittal of required closeout documents, the Architect will conduct a Final Inspection of the Work.
- B. Accompany Owner's Project Representative and Architect on final inspection of the Work.
- C. Complete items of Work determined and identified during final inspection.

3.05 OWNER'S FINAL ACCEPTANCE OF THE WORK

- A. Upon satisfactory completion of the Work, the Architect will recommend acceptance of the completed Work by the Owner and final payment to the Contractor.
- B. The Owner will notify the Contractor in writing of the effective date of their acceptance of the completed Work.

END OF SECTION

SECTION 01 7823
OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Operation and Maintenance Data.
- B. Warranties and bonds.

1.02 RELATED SECTIONS

- A. Document 00 7200 - General Conditions and 00 7300 - Supplementary Conditions: Warranty, and correction of work.
- B. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- C. Section 01 7700 - Closeout Procedures: Contract closeout procedures.
- D. Section 01 7900 - Demonstration and Training: Operation and maintenance instruction of Owner's personnel.
- E. Individual Product Sections: Specific requirements for operation and maintenance data.
- F. Individual Product Sections: Warranties required for specific products or Work.

1.03 PRE-SUBMITTAL MEETING

- A. Convene 15 days before starting work on Operation and Maintenance Manuals for the purpose of reviewing Architect's comments on preliminary draft.

1.04 SUBMITTALS

- A. Operation and Maintenance Data:
 - 1. Preliminary Draft: Prepare two copies within 30 days after start of Work. Indicate proposed formats and outlines of contents. Architect will review draft and return one copy with comments.
 - 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
 - 3. Submit 2 copies of completed documents upon 50 percent completion of construction operations. One copy will be returned within 15 days, with Architect review comments. Revise content of all document sets required for final submission.
 - 4. Submit 3 sets of revised final documents in final form at least 45 days prior to estimated date of "Substantial Completion" for use by Owner's personnel during demonstration and training activities specified in Section 01 7900.
- B. Product and Material Warranties: Obtain required manufacturer's warranties; assemble original documents in separate three-ring binder to be submitted within 10 days after Date of Substantial Completion, prior to final Application for Payment.
 - 1. Ensure that manufacturer's warranties have been completed in OWNER's name and registered with respective manufacturer.
 - 2. Include photocopies of each in operation and maintenance manuals, indexed separately on Table of Contents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PREPARATION OF OPERATION AND MAINTENANCE (O&M) MANUALS

- A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- B. Prepare data in the form of an instructional manual.
- C. Binders: Commercial quality, 8-1/2 x 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. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.
- F. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- G. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- H. Arrange content by specification section under section numbers and sequence of Table of Contents of this Project Manual.
- I. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 - 3. Part 3: Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - b. Air and water balance reports.
 - c. Certificates.
 - d. Photocopies of warranties and bonds.
- J. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.
- K. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Architect, Consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

3.02 OPERATION AND MAINTENANCE DATA

- A. 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 CARE AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. For Each Product, Applied Material, and Finish: Product data, with catalog number, size, composition, and color and texture designations.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Additional information as specified in individual product specification sections.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. Provide a listing in Table of Contents for Design Data provided by the Architect, with tabbed fly sheet and space for insertion of data.
- B. 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.
- 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.
- 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 charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- M. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- N. Include test and balancing reports.
- O. Additional Requirements: As specified in individual product specification sections.

3.05 WARRANTIES

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within ten 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 the 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.
 - 1. Include photocopies of each in operation and maintenance manuals, indexed separately on Table of Contents.
- E. Manual of Warranties and Bonds: Bind original documents in commercial quality 8-1/2 x 11 inch three D side ring binders with durable plastic covers.
 - 1. Cover: Identify 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.
 - 2. 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.

3. 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

SECTION 01 7900
DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

- A. Demonstration of products and systems where indicated in specific specification sections.
- B. Training of Owner personnel in operation and maintenance is required for:
 - 1. All software-operated systems.
 - 2. HVAC systems and equipment.
 - 3. Plumbing equipment.
 - 4. Electrical systems and equipment.
 - 5. Conveying systems.
 - 6. Items specified in individual product Sections.
- C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
 - 1. Roofing, waterproofing, and other weather-exposed or moisture protection products.
 - 2. Finishes, including flooring, wall finishes, ceiling finishes.
 - 3. Fixtures and fittings.
 - 4. Items specified in individual product Sections.

1.02 RELATED REQUIREMENTS

- A. Section 01 7700 - Closeout Procedures.
- B. Section 01 7823 - Operation and Maintenance Data: Preparation of O&M manuals.
- C. Other Specification Sections: Additional requirements for demonstration and training.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate work with preparation of operation and maintenance data specified in Section 01 7823.
- B. Scheduling:
 - 1. Schedule work to ensure training sessions are completed prior to Request for Substantial Completion Inspection.
 - 2. Do not start training until Functional Testing is complete.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Training Plan: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
 - 1. Submit to Architect for transmittal to Owner.
 - 2. Submit not less than four weeks prior to start of training.
 - 3. Revise and resubmit until acceptable.
 - 4. Provide an overall schedule showing all training sessions.
 - 5. Include at least the following for each training session:
 - a. Identification, date, time, and duration.
 - b. Description of products and/or systems to be covered.
 - c. Name of firm and person conducting training; include qualifications.
 - d. Intended audience, such as job description.
 - e. Objectives of training and suggested methods of ensuring adequate training.
 - f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
 - g. Media to be used, such as slides, hand-outs, etc.
 - h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.
- C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
 - 1. Include applicable portion of O&M manuals.

2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
 3. Provide one extra copy of each training manual to be included with operation and maintenance data.
- D. Training Reports:
1. Identification of each training session, date, time, and duration.
 2. Sign-in sheet showing names and job titles of attendees.
 3. List of attendee questions and written answers given, including copies of and references to supporting documentation required for clarification; include answers to questions that could not be answered in original training session.
 4. Include Owner's formal acceptance of training session.

1.05 QUALITY ASSURANCE

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
 2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DEMONSTRATION - GENERAL

- A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.
- B. Demonstration may be combined with Owner personnel training if applicable.
- C. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
1. Perform demonstrations not less than two weeks prior to Substantial Completion.
 2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.02 TRAINING - GENERAL

- A. Conduct training on-site unless otherwise indicated.
- B. Owner will provide classroom and seating at no cost to Contractor.
- C. Provide training in minimum two hour segments.
- D. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.
- E. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
1. The location of the O&M manuals and procedures for use and preservation; backup copies.
 2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
 3. Typical uses of the O&M manuals.
- F. Product- and System-Specific Training:
1. Review the applicable O&M manuals.

2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
 3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
 4. Provide hands-on training on all operational modes possible and preventive maintenance.
 5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
 6. Discuss common troubleshooting problems and solutions.
 7. Discuss any peculiarities of equipment installation or operation.
 8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
 9. Review recommended tools and spare parts inventory suggestions of manufacturers.
 10. Review spare parts and tools required to be furnished by Contractor.
 11. Review spare parts suppliers and sources and procurement procedures.
- G. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION

**SECTION 02 4100
DEMOLITION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selective demolition of building elements for alteration purposes.
- B. Abandonment and removal of existing utilities and utility structures.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 01 1000 - Summary: Sequencing and staging requirements.
- C. Section 01 1000 - Summary: Description of items to be removed by Owner.
- D. Section 01 1000 - Summary: Description of items to be salvaged or removed for re-use by Contractor.
- E. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- F. Section 01 6000 - Product Requirements: Handling and storage of items removed for salvage and relocation.
- G. Section 01 7300 - Execution Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring

1.03 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner's designated storage area.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.04 REFERENCE STANDARDS

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.

1.05 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.

1.06 PERMITS

- A. Contractor shall comply with all applicable local, state, and federal requirements regarding materials, methods of work, and disposal of excess and waste materials.
- B. Contractor shall obtain and pay for all required inspections, sampling, analytical costs, permits, and fees. Provide notices required by governmental authorities.

1.07 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals for submittal procedures.
- B. Site Plan: Indicate:
 - 1. Vegetation to be protected.
 - 2. Areas for temporary construction and field offices.
 - 3. Areas for temporary and permanent placement of removed materials.

- C. Demolition Plan: Submit demolition plan as required by OSHA and local AHJs.
 - 1. Indicate extent of demolition, removal sequencing, bracing and shoring, and location and construction of barricades and fences.
 - 2. Include a summary of safety procedures.
 - 3. Include measures for environmental protection, for dust control, and for noise control.
 - 4. Detail special measures proposed to protect adjacent buildings or spaces to remain including means of egress.
- D. Inventory of items that have been removed and salvaged.
- E. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.08 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

1.09 FIELD CONDITIONS

- A. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.
 - 1. Provide not less than 72 hours notice of activities that will affect operations of adjacent occupied buildings.
 - 2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.
 - a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- D. On-site storage or sale of removed items or materials is not permitted.
- E. Arrange demolition schedule so as not to interfere with Owner's on-site operations or operations of adjacent occupied buildings or spaces.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide all materials necessary to safely demolish and remove items indicated.

PART 3 EXECUTION

3.01 DEMOLITION

- A. Remove other items indicated, for salvage, relocation, and recycling.
 - 1. Provide non-permanent identification for items that require being reinstalled in the same location or in sequence.
- B. Fill openings or penetrations as result of removals, firestop at rated walls as indicated in code plan.

3.02 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

3.03 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.

1. Obtain required permits.
 2. Comply with applicable requirements of NFPA 241 and IBC Chapter 33.
 3. Use of explosives is not permitted.
 4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 5. Provide, erect, and maintain temporary barriers and security devices.
 - a. Erect barriers, fences, guard rails, enclosures, chutes, and shoring to protect personnel, structures, and utilities remaining intact.
 - b. Protect existing objects designated to remain, and in the event of damage, immediately make repairs or replacements necessary to the approval of the Owner's Representative at no additional cost to the Owner.
 6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 - a. Remove temporary barriers and protections where hazards no longer exist.
 - b. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.
 7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 8. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
 9. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
 10. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Do not begin removal until built elements to be salvaged or relocated have been removed.
- D. Survey existing conditions 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 building demolition operations. Notify Architect or Engineer of any concerns.
- E. Protect existing structures and other elements to remain in place and not removed.
 1. Provide bracing and shoring.
 2. Prevent movement or settlement of adjacent structures.
 3. Stop work immediately if adjacent structures appear to be in danger.
- F. Minimize production of dust due to demolition operations. Do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- G. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
- H. Perform demolition in a manner that maximizes salvage and recycling of materials.
 1. Dismantle existing construction and separate materials.
 2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

3.04 EXISTING UTILITIES

- A. Coordinate work with utility companies. Notify utilities before starting work, comply with their requirements, and obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
 1. Contractor to coordinate utility shut-downs or disruptions with the Owner through the CM. Notices shall be as identified in Division 01 sections and as agreed to at Pre-Construction meeting.

2. Contractor to coordinate and cooperate with local utilities concerning their removal, demolition, or relocation of utilities.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 7 days prior written notification to Owner.
- F. Verify that utilities have been disconnected and capped before starting demolition operations.
- G. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- H. Unused underground piping may be abandoned in place, provided it is completely drained and capped; remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.
- I. Utility Adjustment:
 1. Contractor shall be responsible for the adjustment of all gas vents, manholes, castings, water valves, and fire hydrants to match the new surface. Adjustments shall be coordinated with the utility companies and the cost for all adjustments shall be incidental to construction. Any damage to said structures and appurtenances that occurs during construction, shall be repaired by the Contractor at no additional cost to the Owner.
- J. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone. Identify and mark, in same manner as other utilities to remain, utilities to be reconnected.

3.05 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation only.
 1. Verify construction and utility arrangements are as indicated.
 2. Report discrepancies to Architect before disturbing existing installation.
 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Cooperate with the Owner and Authorities Having Jurisdiction to provide Interim Life Safety Measures (ILSM) in all areas affected by demolition or construction operations.
 1. Ensure exits provide an unobstructed egress. Building areas under construction must maintain escape facilities for construction workers at all times. Provide alternate routes around closed or obstructed traffic-ways if required by authorities having jurisdiction.
 2. Ensure fire alarm, detection and suppression systems are not impaired. Provide temporary systems if necessary.
 3. Ensure temporary construction partitions are smoke-tight and built of non-combustible or limited combustible materials that will not contribute to the development or spread of fire.
 4. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.
 5. Develop and enforce storage, housekeeping, and debris removal practices that reduce the flammable and combustible fire load of the building to the lowest level necessary for daily operations as stated in the general conditions.
 6. Provide hazard surveillance of building, grounds, and equipment with attention to construction areas, construction storage, and field offices.
 7. Follow NFPA 241 guidelines pertaining to safe-guarding for construction and demolition processes.
 8. Follow NFPA 1 guidelines pertaining to fire prevention measures.
- C. Separate areas in which demolition is being conducted from areas that remain occupied.
 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 5000 to separate work areas from non-work areas.
- D. Structural Demolition:

1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
 2. Maintain fire watch during and for at least 24 hours after flame-cutting operations.
 3. Maintain adequate ventilation when using cutting torches.
- E. Maintain weatherproof exterior building enclosure, except for interruptions required for replacement or modifications; prevent water and humidity damage.
- F. Salvaged Items: Comply with the following:
1. Clean salvaged items of dirt and demolition debris.
 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 storage area designated by Owner.
 5. Protect items from damage during transport and storage.
- G. Remove existing work as indicated and required to accomplish new work.
1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction indicated.
 2. Remove items indicated on drawings.
 3. Inventory and record the condition of items to be removed and salvaged.
- H. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
1. Maintain existing active systems to remain in operation, and maintain access to equipment and operational components.
 2. 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.
 3. See Section 01 1000 - Summary for limitations on outages and required notifications.
 4. Verify that abandoned services serve only abandoned facilities before removal.
 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.
- I. Protect existing work to remain.
1. Prevent movement of structure. Provide shoring and bracing as required.
 2. Perform cutting to accomplish removal work neatly and as specified for cutting new work.
 3. Repair adjacent construction and finishes damaged during removal work.
 4. Patch to match new work.

3.06 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
1. Do not allow demolished materials to accumulate on-site.
 2. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 3. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 4. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 5. Project Coordinator will provide dumpster and coordinate with waste hauler for drop off and pick-up.
 6. Dumpster to be located as agreed upon at Pre-Bid meeting or by Owner direction.
- B. Remove from site all materials not to be reused on site; do not burn or bury.
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

**SECTION 03 5400
CAST UNDERLAYMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Liquid-applied self-leveling floor underlayment.
 - 1. Use gypsum-based type at floor infill locations indicated for acoustic and wood underlayment.

1.02 RELATED REQUIREMENTS

- A. Section 01 7000 - Execution and Closeout Requirements: Alteration project procedures; selective demolition for remodeling.
- B. Section 06 1000 - Rough Carpentry: BASE BID for fiberboard (acoustic) and wood (finish) underlayments at floor infill.

1.03 PRICE AND PAYMENT PROCEDURES

- A. Alternates:
 - 1. See Section 01 2300 - Alternates for product alternates affecting this section.
 - 2. This section includes alternate item(s). See Section 06 1000 for base bid products.

1.04 REFERENCE STANDARDS

- A. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
- B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- D. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data sheets documenting physical characteristics and product limitations of underlayment materials. Include information on surface preparation, environmental limitations, and installation instructions.
- C. Manufacturer's Instructions.

1.06 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the work of this section, and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Keep dry and protect from direct sun exposure, freezing, and ambient temperature greater than 105 degrees F.

1.08 FIELD CONDITIONS

- A. Do not install underlayment until floor penetrations and peripheral work are complete.
- B. Maintain minimum ambient temperatures of 50 degrees F 24 hours before, during and 72 hours after installation of underlayment.
- C. During the curing process, ventilate spaces to remove excess moisture.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Gypsum Underlayment:

1. ARDEX Engineered Cements; ARDEX K 22 F: www.ardexamericas.com/#sle.
 2. Hacker Industries, Inc; Firm-Fill Gypsum Concrete: www.hackerindustries.com/#sle.
 3. **BASIS OF DESIGN:** Maxxon Corporation; Gyp-Crete 2000/3.2K: www.maxxon.com/#sle.
 4. USG; Levelrock CSD Early Exposure Series Floor Underlayment: www.usg.com/#sle.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Sound Control Mat:
1. Arcosa Specialty Products, Inc: www.acgmaterials.com/#sle.
 2. Hacker Industries, Inc; Firm-Fill SCM 250: www.hackerindustries.com/#sle.
 3. Keene Building Products; Quiet Qurl 025: www.keenebuilding.com/#sle.
 4. **BASIS OF DESIGN:** Maxxon Corporation; Acousti-Mat 1/4 Premium: www.maxxon.com/#sle.
 5. USG; www.usg.com
 6. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

- A. Cast Underlayments, General:
1. Comply with applicable code for combustibility or flame spread requirements.
 2. Provide certificate of compliance from authority having jurisdiction indicating approval of underlayment materials in the required fire rated assembly.
- B. Gypsum-Based Underlayment: Gypsum based mix, that when mixed with water in accordance with manufacturer's directions will produce self-leveling underlayment with the following properties:
1. Compressive Strength: Minimum 2500 pounds per square inch, tested per ASTM C472.
 2. Density: Maximum 130 pounds per cubic foot.
 3. Final Set Time: 1 to 2 hours, maximum.
 4. Thickness: 1-1/4 inch (including mat).
 5. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0 in accordance with ASTM E84.
- C. Aggregate: Dry, well graded, washed silica aggregate, approximately 1/8 inch in size and acceptable to underlayment manufacturer.
- D. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to underlayment mix materials.
- E. Primer: Manufacturer's recommended type.
- F. Joint and Crack Filler: Latex based filler, as recommended by manufacturer.
- G. Sound Control Mat: Sheet material, perimeter isolation strip, and tape; as recommended by the underlayment manufacturer.
1. Thickness: 1/4 inch

2.03 MIXING

- A. Site mix materials in accordance with manufacturer's instructions.
- B. Add aggregate for areas where thickness will exceed 1/2 inch. Mix underlayment and water for at least two minutes before adding aggregate, and continue mixing to assure that aggregate has been thoroughly coated.
- C. Mix to self-leveling consistency without over-watering.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are clean, dry, unfrozen, do not contain petroleum byproducts, or other compounds detrimental to underlayment material bond to substrate.

3.02 PREPARATION

- A. Concrete: Mechanically prepare steel troweled concrete to create a textured surface necessary to achieve the best bond; acceptable methods include bead blasting and scarifying. Do not use acid etching.
- B. Concrete: Prepare surfaces according to ICRI 310.2R, CSP 3.
- C. Wood: Install metal lath for reinforcement of underlayment.
- D. Remove substrate surface irregularities. Fill voids and deck joints with filler. Finish smooth.
- E. Vacuum clean surfaces.
- F. Prime substrate in accordance with manufacturer's instructions. Allow to dry.
- G. Close floor openings.
- H. Install sound control mat in accordance with manufacturer's instructions.

3.03 APPLICATION

- A. Install underlayment in accordance with manufacturer's instructions.
- B. Pump or pour material onto substrate. Do not retemper or add water.
 - 1. Pump, move, and screed while the material is still highly flowable.
 - 2. Be careful not to create cold joints.
 - 3. Wear spiked shoes while working in the wet material to avoid leaving marks.
- C. Place to indicated thickness, with top surface level to 1/8 inch in 10 ft.
- D. Place before partition installation.
- E. Where additional aggregate has been used in the mix, add a top layer of neat mix (without aggregate), if needed to level and smooth the surface.
- F. If a fine, feathered edge is desired, steel trowel the edge after initial set, but before it is completely hard.

3.04 CURING

- A. Once underlayment starts to set, prohibit foot traffic until final set has been reached.
- B. Air cure in accordance with manufacturer's instructions.

3.05 PROTECTION

- A. Protect against direct sunlight, heat, and wind; prevent rapid drying to avoid shrinkage and cracking.
- B. Do not permit traffic over unprotected floor underlayment surfaces.

END OF SECTION

SECTION 05 1200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes structural steel and grout.

1.2 RELATED SECTIONS

- A. Section 05 5000 – Metal Fabrications

1.3 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 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 loads indicated and comply with other information and restrictions indicated.
 - 1. Select and complete connections using schematic details indicated and AISC 360.
 - 2. Use ASD; data are given at service-load level.
- B. Moment Connections: Type FR, fully restrained.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.
- C. Qualification Data: For qualified Installer fabricator.
- D. Welding certificates.
- E. Mill test reports for structural steel, including chemical and physical properties.
- F. Source quality-control reports.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
- B. Installer Qualifications: A qualified installer who can show a minimum of 5 years of similar experience.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel." Engineer may request welder certification at any time.
- D. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
 - 2. AISC 360-05.
 - 3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- E. Preinstallation Conference: Conduct conference at Project site. Conference is required before steel detailing begins.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M.
- B. Channels, Angles, M, S-Shapes: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- E. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.

- F. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.
- B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers with plain finish.
1. Direct-Tension Indicators: ASTM F 959, Type 490, compressible-washer type with plain finish.
- C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.
1. Finish: Hot-dip zinc coating.
 2. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with mechanically deposited zinc coating finish.
- D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
1. Finish: Plain.
- E. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
- F. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
1. Configuration: Straight.
 2. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
- G. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
- H. Threaded Rods: ASTM A 36/A 36M.
1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

2.3 PRIMER

- A. Low-Emitting Materials: Paints and coatings shall 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."
- B. Primer: Comply with Division 09 painting Sections.
1. Contractor shall submit paint specifications with bid submittal.
- C. Primer: SSPC-Paint 25, zinc oxide, alkyd, linseed oil primer.
- D. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.4 GROUT

- A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

- A. 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 360-05.
- B. 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/D1.1M and manufacturer's written instructions.

2.6 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 Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.7 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.
 - 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 (applied fireproofing).
 - 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."
 - 2. SSPC-SP 3, "Power Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.8 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports per the requirements of chapter 17 of the International Building Code.
 - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1. Liquid Penetrant Inspection: ASTM E 165.

2. 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.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 2. Weld plate washers to top of baseplate.
 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 plate before packing with grout.
 4. Promptly pack grout solidly between bearing surfaces and 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.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.3 FIELD CONNECTIONS

- A. High-Strength Bolts: 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.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections per the requirements of chapter 17 of the International Building Code.
- B. Bolted Connections: Bolted connections will be [tested and] inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
 1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M 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. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

END OF SECTION

05 21 00 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. K-series and KCS type K-series steel joists.
- B. LH and DLH-series long-span steel joists.
- C. Joist accessories.

1.2 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 nonuniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.3 SUBMITTALS

- A. Product Data: For each type of joist, accessory, and product indicated.
- B. Shop Drawings: Show layout, designation, number, type, location, and spacings 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.

1.4 QUALITY ASSURANCE

- A. SJI Specifications: Comply with standard specifications in SJI's "Specifications" that are applicable to types of joists indicated.
- B. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.5 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.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Steel: Comply with SJI's "Specifications" for web and steel-angle chord members.

2.2 PRIMERS

- A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

2.3 K-SERIES AND KCS-TYPE 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; of joist type and end and top-chord arrangements as indicated in Project Documents.
 - 1. Joist Type: K-series steel joists and KCS-type K-series steel joists.
- B. Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications."
- C. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."

2.4 LH AND DLH SERIES LONG-SPAN STEEL JOISTS

- A. Manufacture steel joists of type indicated according to "Standard Specifications for Long-Span Steel Joists, LH-Series and Deep Long-Span 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 indicated in Project Documents.

1. Joist Type: LH and DLH-series steel joists.

2.5 JOIST ACCESSORIES

- A. Steel bearing plates with integral anchorages are specified in Division 5 Section "Metal Fabrications."
- B. 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 of finished wall surface, unless otherwise indicated.

2.6 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 thick.

PART 3 - EXECUTION

3.1 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.

3.2 INSTALLATION

- A. Do not install joists until supporting construction is in place and secured.
- B. 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.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner may engage a qualified independent testing and inspecting agency to inspect field welds and bolted connections and to perform field tests and inspections and prepare test and inspection reports.
- B. Correct deficiencies in Work that test and inspection reports have indicated are not in compliance with specified requirements.
- C. Additional testing will be performed to determine compliance of corrected Work with specified requirements.

3.4 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. 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 05 21 00

SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel items, including:
 - 1. Removable wood rail support and connections.
- B. Miscellaneous angles, channels, tubes, plates, brackets and fasteners, as required to complete the project.

1.02 RELATED REQUIREMENTS

- A. Section 05 5213 - Pipe and Tube Railings: wall-mount and freestanding handrails
- B. Section 06 2000 - Finish Carpentry: removable wood rail requiring coordination with work of this section.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- C. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
- D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
- E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- 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. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
- I. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification.
- J. AWS D1.1/D1.1M - Structural Welding Code - Steel.
- K. AWS D1.2/D1.2M - Structural Welding Code - Aluminum.
- L. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc.
- M. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer.
- N. SSPC-SP 2 - Hand Tool Cleaning.

1.04 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 2. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 3. Where installing items to existing precast concrete, concrete or masonry, propose connections not detailed for structural engineer approval.

- C. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
- D. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.05 QUALITY ASSURANCE

- A. Design members and connections 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. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.2/D1.2M and dated no more than 12 months before start of scheduled welding work.
- C. Fabricate steel items in accordance with AISC "Steel Construction Manual."

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A500/A500M, Grade B cold-formed structural tubing.
- C. Plates: ASTM A283/A283M.
- D. Slotted Channel Framing: ASTM A653/A653M, Grade 33.
- E. Slotted Channel Fittings: ASTM A1011/A1011M.
- F. Bolts, Nuts, and Washers: ASTM A307, galvanized to ASTM A153/A153M where connecting galvanized components.
- G. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- H. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- I. Anchoring Devices:
 - 1. Anchor Rods: Anchor rods used with structural steel members shall be plain steel rods conforming to ASTM F1554 (Grade 36), complete with suitable nuts and washers, unless noted otherwise.
 - 2. Expansion Bolts: Expansion anchors shall consist of one-piece wedge type carbon steel anchor bolts with heavy-duty nuts and washers. All components shall be zinc plated in accordance with ASTM B633.
 - a. Structural Applications
 - 1) Acceptable products must have a valid and current ICC report, as listed at www.icc-es.org <<http://www.icc-es.org>>.
 - b. Non-Structural Applications
 - 1) Acceptable Manufacturers and products: Hilti Fastening Systems- Kwik Bolt III Anchor; ITW Red Head Mechanical Anchoring Systems - Trubolt Wedge Anchor; Powers Fastening Inc - Power-Stud Anchor; (or approved equivalent)
 - 3. Epoxy Adhesive Anchoring System: Epoxy anchoring shall consist of a threaded rod and the epoxy adhesive cartridge.
 - a. Structural Applications
 - 1) Acceptable products must have a valid and current ICC report, as listed at www.icc-es.org <<http://www.icc-es.org>>.
 - b. Non-Structural Applications
 - c. Acceptable Manufacturers and products: Hilti Fastening System - HIT RE 500; ITW Red Head Adhesive Anchoring Systems - Epcon C6 Adhesive; Powers Fastening Inc. - PE1000+; (or approved equivalent).
- J. Grout: Non-shrink, non-metallic aggregate type, complying with ASTM C 1107/C 1107M and capable of developing a minimum compressive strength of 5,000 psi at 28 days.

2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by continuous welds, where welding is indicated.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- G. Welded Joints: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings. Weld corners and seams continuously where visible or where exposed to moisture, even if intermittent or stitch welds are structurally adequate, and to comply with the following:
 - 1. Interior Components: Continuously seal joined pieces by continuous welds.
 - 2. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

2.03 FABRICATED ITEMS

- A. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of non-structural members; prime paint finish.
- B. Support Steel Components for Removable Wood Rails: Steel; prime paint finish.
 - 1. Sizes and Configurations: As indicated on Drawings.

2.04 FINISHES - STEEL

- A. Prime paint steel items.
 - 1. Exceptions: Do not prime surfaces where field welding is required.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.

2.05 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Examine substrates and site area for conditions that might prevent satisfactory installation.
 - 1. Where installing items to existing precast concrete, concrete or masonry, propose connections not detailed for structural engineer approval.
- C. Verify that dimensions of supporting structure are within plus/minus 1/8 inch of dimensions shown on shop drawings.
- D. Verify that all adjacent painting, roofing, masonry work, and other work that might damage prefinished items has been completed prior to installation.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Furnish setting templates to the appropriate entities for steel items required to be embedded in masonry.
- C. Remove all mill scale, rust, grease, foreign matter and surface imperfections from steel components that will be painted to ensure a smooth, even appearance of finish.

3.03 INSTALLATION

- A. Install premanufactured items in accordance with manufacturer's installation instructions.
- B. Install items plumb and level, accurately fitted, free from distortion or defects.
- C. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- D. Anchor units to structure as indicated on the drawings.
- E. Field weld components as indicated on shop drawings.
 - 1. Perform field welding in accordance with AWS D1.1/D1.1M.
- F. Obtain approval prior to site cutting or making adjustments not scheduled.
- G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.
- H. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors. Grout voids as required to result in secure installation.
- I. Touch-up damaged finish coating using material provided by manufacturer to match original coating.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/8 inch per story or 10 feet, non-cumulative.
- B. Maximum Offset From True Alignment: 1/8 inch in 10 feet.
- C. Maximum Out-of-Position: 1/8 inch in 48 inches.

3.05 PROTECTION

- A. Protect items after installation to prevent damage due to other work until Date of Substantial Completion

END OF SECTION

SECTION 05 5213
PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall mounted handrails.
- B. Floor-mounted railings at steps.

1.02 RELATED REQUIREMENTS

- A. Section 09 2116 - Gypsum Board Assemblies: Placement of backing plates in stud wall construction.
- B. Section 09 9123 - Interior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design.
- B. AISC 201 - AISC Certification Program for Structural Steel Fabricators, Standard for Steel Building Structures.
- C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- D. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- E. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- F. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
- G. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
- H. AWS D1.1/D1.1M - Structural Welding Code - Steel.
- I. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer.

1.04 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

1.05 QUALITY ASSURANCE

- A. Welder Qualifications: Welding processes and welding operators qualified within previous 12 months.
- B. Fabricator Qualifications: one of the following:
 - 1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201.
 - 2. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Handrails and Railings:
 - 1. CR Lawrence; www.crlawrence.com
 - 2. The Wagner Companies; www.wagnercompanies.com/#sle.
 - 3. Custom fabrication meeting the requirements of this section.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 RAILINGS - GENERAL REQUIREMENTS

- A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of applicable local code.
- B. 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.
- C. 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.
- D. Allow for expansion and contraction of members and building movement without damage to connections or members.
- E. Dimensions: See drawings for configurations and heights.
 - 1. Top Rails and Wall Rails: 1-1/2 inches diameter, round.
 - 2. Posts: 1-1/2 inches diameter, round.
 - 3. Brackets: manufacturer's standard, material and finish to match handrail.
- F. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
 - 1. For anchorage to concrete, provide inserts to be cast into concrete, for bolting anchors.
 - 2. For anchorage to masonry, provide brackets to be embedded in masonry, for bolting anchors.
 - 3. For anchorage to stud walls, provide backing plates, for bolting anchors.
- G. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.
- H. Welded and Brazed Joints: Make visible joints butt tight, flush, and hairline; use methods that avoid discoloration and damage of finish; grind smooth, polish, and restore to required finish.
 - 1. Ease exposed edges to a small uniform radius.
 - 2. Welded Joints:
 - a. Carbon Steel: Perform welding in accordance with AWS D1.1/D1.1M.

2.03 STEEL RAILING SYSTEM

- A. Steel Tube: ASTM A500/A500M, Grade B cold-formed structural tubing.
- B. Steel Pipe: ASTM A53/A53M, Grade B Schedule 80, black finish.
- C. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.
- D. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.
- E. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.04 FABRICATION

- A. Accurately form components to suit specific project conditions and for proper connection to building structure.
- B. Fit and shop assemble components in largest practical sizes for delivery to site.
- C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.
- D. Welded Joints:
 - 1. Interior Components: Continuously seal joined pieces by continuous welds.
 - 2. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

- E. Weld connections that cannot be shop welded due to size limitations.
 - 1. Weld in accordance with AWS D1.1/D1.1M.
 - 2. Match shop welding and bolting.
 - 3. Clean welds, bolted connections, and abraded areas.
 - 4. Touch up shop primer and factory-applied finishes.
 - 5. Repair galvanizing with galvanizing repair paint per ASTM A780/A780M.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Apply one coat of bituminous paint to concealed aluminum surfaces that will be in contact with cementitious or dissimilar materials.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
- C. Install railings in compliance with ADA Standards for accessible design at applicable locations.
- D. Anchor railings securely to structure.
- E. Field weld anchors as indicated on shop drawings. Touch-up welds with primer. Grind welds smooth.
- F. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

**SECTION 06 1000
ROUGH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-structural dimension lumber framing, associated with platforms, steps and ramps.
- B. Rough opening framing for door openings.
- C. Subflooring.
- D. Underlayment, fiberboard (acoustic) and wood-based (finish).
- E. Concealed wood blocking, nailers, and supports.
 - 1. Includes dimension lumber framing, associated with casework and finish carpentry.

1.02 RELATED REQUIREMENTS

- A. Section 03 5400 - Cast Underlayment: ALTERNATE to acoustic and wood underlayment at floor infill.
- B. Section 05 5000 - Metal Fabrications: concealed steel support items.
- C. Section 06 2000 - Finish Carpentry: finish applied to wood stud partial height partitions.
- D. Section 06 4100 - Architectural Woodwork: items requiring blocking or wood stud partial height partitions.
- E. Section 09 9000 - Painting and Coating: Painting of exposed mounting boards.

1.03 PRICE AND PAYMENT PROCEDURES

- A. Alternates:
 - 1. See Section 01 2300 - Alternates for product alternates affecting this section.
 - 2. This section includes base bid item(s). See Section 06 1000 for alternate products

1.04 REFERENCE STANDARDS

- A. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor System Framing.
- B. PS 1 - Structural Plywood.
- C. PS 20 - American Softwood Lumber Standard.

1.05 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals for submittal procedures.
- B. Product Data: Provide technical data on construction panel materials.
- C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

- A. Lumber: Comply with PS 20 and approved grading rules and inspection agencies.
- B. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, and installation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.

1. Species: Douglas Fir-Larch, unless otherwise indicated.
 2. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
 3. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
 4. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.
- B. Engineered wood products containing added urea-formaldehyde are not permitted.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
1. Lumber: S4S, No. 2 or Standard Grade.
 2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

- A. Subflooring: see S-101 for information.
- B. Acoustic Underlayment: non-structural fiberboard panels
1. Application: sandwiched between subfloor and wood underlayment.
 - a. Note: Alternate No.1 shall include Gypcrete with sound mat in lieu of acoustic underlayment with wood underlayment finish.
 2. Thickness: 1/2 inch
 3. NRC: 0.30
 4. Product: Georgia Pacific: Hushboard Sound Deadening Board or approved equal
- C. Wood Underlayment: Oriented strand board wood structural panel; PS 2.
1. Note: Alternate No.1 shall include Gypcrete with sound mat in lieu of acoustic underlayment with wood underlayment finish.
 2. Grade: Sheathing.
 3. Bond Classification: Exposure 1.
 4. Thickness: 3/4 inch
 5. Edges: tongue and groove
 6. Fully sanded faces.
- D. Concealed Backing for wall-mounted items- provide backing as required for loading from one of the following:
1. Dimension Lumber: as noted above
 2. Plywood: as noted below
- E. Plywood Applications:
1. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
 2. Other Locations: PS 1, C-D Plugged or better.

2.04 ACCESSORIES

- A. Fasteners and Anchors:
1. Metal and Finish: Stainless steel for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
 2. Anchors: as follows:
 - a. Toggle bolt type for anchorage to hollow masonry.
 - b. Expansion shield and lag bolt type for anchorage to solid masonry or concrete.
 - c. Bolt or ballistic fastener for anchorages to steel.
 3. Wood Screws: ASME B18.6.1.

4. Lag Bolts: ASME B18.2.1.
 5. Power Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ACC-ES AC70.
- B. Subfloor Adhesives: Gap-filling construction adhesive for bonding wood structural panels to wood-based floor system framing; complying with ASTM D3498.

PART 3 EXECUTION

3.01 PREPARATION

- A. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

3.03 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to authorities having jurisdiction may be used in lieu of solid wood blocking.
- C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
- D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- F. Provide the following specific nonstructural framing and blocking:
1. Cabinets and shelf supports.
 2. Wall brackets.
 3. Handrails.
 4. Grab bars.
 5. Towel and bath accessories.
 6. Wall-mounted door stops.
 7. Chalkboards, tack boards and marker boards.
 8. Wall paneling and trim.
 9. Joints of rigid wall coverings that occur between studs.
 10. Wall-protection items, including corner guards.
 11. Owner-provided wall-mounted equipment, whether owner-installed or contractor-installed.

3.04 INSTALLATION OF CONSTRUCTION PANELS

- A. Subflooring/Underlayment Combination: Glue and nail to framing; staples are not permitted.

3.05 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.
- C. Variation from Plane, Other than Floors: 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.06 CLEANING

- A. Waste Disposal:
1. Comply with applicable regulations.

2. Do not burn scrap on project site.
 3. Do not burn scraps that have been pressure treated.
 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- B. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 2000
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior finish carpentry items, including but not limited to:
 - 1. Wood door frames.
 - 2. Wood casings and moldings, including:
 - a. Solid wood base and trim.
 - b. Wood door casings.
 - c. Wood nosings at platforms or steps.
 - d. Wood door frames.
 - e. Running trim; chair and picture rail.
 - f. Sill trim
 - g. Dentil moulding.
 - 3. Wood veneer wall paneling.
 - 4. Removable wood rail.
- B. Hardware and attachment accessories.
- C. Factory/shop finishing of specific woodwork items.
- D. Preparation for site finishing of specific woodwork items.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 05 5000 - Metal Fabrications: Support steel tube structure for newel posts at fixed wood rails.
- C. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- D. Section 06 4100 - Architectural Wood Casework: Coordination with shop fabricated custom cabinet work.
- E. Section 08 1433 - Stile and Rail Wood Doors.
- F. Section 09 0190 - Maintenance of Finishes: refinishing of existing millwork.
- G. Section 09 9300 - Staining and Transparent Finishing: Site staining and transparent finishing of finish carpentry items.

1.03 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards.
- C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0.
- D. BHMA A156.9 - American National Standard for Cabinet Hardware.
- E. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood.
- F. PS 1 - Structural Plywood.
- G. PS 20 - American Softwood Lumber Standard.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with electrical rough-in and installation of associated and adjacent components.
- B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals for submittal procedures.

- B. Product Data:
 - 1. Provide data for premanufactured items and accessories.
 - 2. Provide data for attachment hardware and finish hardware.
- C. 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 information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
- D. Samples: Submit up to (10) 12" x 12" wood samples for stain color selection.

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
 - 1. Company that follows AWI's "Architectural Woodwork Quality Standards".
 - 2. Fabricator of this section must also provide work specified in Section 06 41 00 - Architectural Wood Casework.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver factory-fabricated units to project site in original packages, containers or bundles bearing brand name and identification.
- B. Store finish carpentry items under cover, elevated above grade, and in a dry, well-ventilated area not exposed to heat or sunlight.
- C. Protect from moisture damage.
- D. Handle materials and products to prevent damage to edges, ends, or surfaces.

1.08 FIELD CONDITIONS

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, utilities, and other related work to ensure that finish carpentry items can be supported and installed as indicated.
- B. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- C. During and after installation of finish carpentry, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.
- D. Do not deliver product until the building is secure and weathertight.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

- A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.
- C. Interior Finish Carpentry Items:
 - 1. Moldings, Bases, Casings, and Miscellaneous Trim:
 - a. Red Oak; field- and factory-applied transparent stained finish.
 - b. The design intent is to refinish all existing woodwork for uniform appearance, and to match Architect-approved sample. It is the Contractor's option to replace existing wood trim in lieu of refinishing.
 - 2. Wood-Veneer Paneling: Red Oak veneer on plywood, stain and transparent finish.

2.02 SUSTAINABILITY CHARACTERISTICS

- A. Wood fabricated from old growth timber is not permitted.

2.03 LUMBER MATERIALS

- A. Hardwood Lumber: Red Oak species, rift cut and comb grain, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.

1. Sizes and profiles as indicated on Drawings. 3/4" thick unless noted otherwise.
2. Joint treatment:
 - a. Running trim: scarf-jointed.
3. Finish: Factory/shop finished to match adjacent millwork or existing wood components.

2.04 SHEET MATERIALS

- A. Softwood Plywood, Not Exposed to View: Any face species, veneer core; PS 1 Grade A-B, glue type as recommended for application.
- B. Hardwood Plywood: Face species Red Oak, rift cut and comb grain, book matched, veneer core; HPVA HP-1, Front Face Grade AA, Back Face Grade 1, center balance match of spliced veneer leaves assembled on panel face; glue type as recommended for application.
 1. No urea-formaldehyde adhesive.
 2. Thickness: 3/4-inch (19 mm) - 13 ply, unless otherwise noted.
 3. Finish: Stained, with water-based polyurethane clear sealer.

2.05 FASTENINGS

- A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds, in compliance with Section 01 6116.
- B. Fasteners: Of size and type to suit application; any finish in concealed locations and color-matched paint finish in exposed locations.
- C. Fasteners for substrate: screws, any finish in concealed locations.
- D. Concealed Joint Fasteners: Threaded steel.

2.06 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Lumber for Shimming, Blocking, and Backing: Softwood lumber of S/P/F species.
- C. Hardwood Edgebanding: Use solid hardwood edgebanding matching species, color, grain, and grade for exposed portions of veneer faced millwork.
- D. Primer: Alkyd primer sealer, in compliance with Section 01 6116.
- E. Wood Filler: Solvent base, tinted to match surface finish color.
- F. Perforated Metal Panels: 18 gage steel, mill finish, with 1/16 inch diameter holes on 1/8 inch staggered pattern.
 1. Application: AV cabinet or closet ventilation
 2. Basis of Design: McNichols Item No. 1611181841: www.mcnichols.com.
 3. Field-Applied Finish: Paint as specified in Section 09 9000; color as selected by Architect.

2.07 SITE FINISHING MATERIALS

- A. Field Finishing: Transparent finish as specified in Section 09 9300.
 1. Provide field-applied finishing at chair rail, wood base and crown/picture rail at walls, and refinished wood trim at windows, transoms, and doors.
 2. The design intent is to refinish all existing woodwork for uniform appearance, and to match Architect-approved sample.

2.08 FABRICATION

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. Fit exposed sheet material edges with 3/8 inch matching hardwood edging. Use one piece for full length only.
- C. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

2.09 SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.

- B. Apply wood filler in exposed nail and screw indentations.
- C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.
- D. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 - 1. Transparent:
 - a. System - 12, Polyurethane, Water-based.
 - b. Stain: as indicated in Interior Finish Schedule to match Architect's sample.
 - c. Sheen: Satin.
- E. Back prime woodwork items to be field finished, prior to installation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.
- C. See Section 06 1000 - Rough Carpentry for installation of recessed wood blocking.

3.02 INSTALLATION

- A. Install custom fabrications in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Do not begin installation until wood materials have been fully acclimated to interior conditions.
- C. Set and secure materials and components in place, plumb and level.
- D. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
- E. Install trim with trim nails at stud or blocking locations.
- F. Install prefinished paneling with nails at 8 inch on center.
- G. Set exposed fasteners, fill with wood filler, and finish to match panel finish.
- H. Install hardware and accessories in accordance with manufacturer's written instructions.

3.03 PREPARATION FOR SITE FINISHING

- A. Provide field-applied finishing at Chair Rail, Wood Base at Walls, and refinished Wood Trim at Windows, Transoms, and Doors to match Stile and Rail Wood Doors specified in Section 08 1433.
- B. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- C. Site Finishing: See Section 09 9300.
- D. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.04 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

SECTION 06 4100
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specially fabricated cabinet units, including:
 - 1. Base cabinets.
- B. Countertops and splashes (SSM-#).
- C. Cabinet hardware and accessories.
- D. Shop/Factory finishing of specific woodwork items.
- E. Preparation for installing utilities.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 05 5000 - Metal Fabrications
- C. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- D. Section 06 2000 - Finish Carpentry: Specially fabricated running trim and base, railings, paneling, etc. adjacent to or coordinating with casework items.
- E. Division 22 - Plumbing: coordination of drop-in sinks, plumbing fixture trim and connections
- F. Division 26 - Electrical: coordination of lighting and electrical trim and connections.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards.
- C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0.
- D. BHMA A156.9 - American National Standard for Cabinet Hardware.
- E. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood.
- F. ISFA 3-01 - Classification and Standards for Quartz Surfacing Material.
- G. NEMA LD 3 - High-Pressure Decorative Laminates.
- H. NSI (DSDM) - Dimensional Stone Design Manual, Version VIII.

1.04 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.

1.05 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals for submittal procedures.
- B. Shop Drawings: Provide casework locations, large scale plans, elevations, cross sections, rough-in and anchor placement dimensions and tolerances, clearances required. Indicate materials, component profiles, configurations, assembly methods, fastening methods, jointing details, utility and service requirements and locations, accessory listings, hardware location and schedule of finishes.
 - 1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
 - 2. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
- C. Product Data: Provide data for hardware accessories.
- D. Finish Verification Samples:
 - 1. For each finish product specified, two each, 6 x 6 inches, of colors and finishes selected by architect.
- E. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.

1.06 DESIGN REQUIREMENTS

- A. Reinforce frame and support counters in all areas, to safely support a load of 200 lbs (90 kg) concentrated on one square foot (0.093 sq m) in any area with no indentation showing on surface and with permanent set not exceeding 0.005 inch (0.127 mm).

1.07 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
- B. Perform work in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, quality indicated below, unless other quality is indicated for specific items.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Accept casework on site. Inspect on arrival for damage.
- B. Protect units from moisture, soiling, or damage during handling and installation.
- C. Protect work surfaces throughout the construction period with corrugated cardboard covering the top and securely taped to edges.

1.09 FIELD CONDITIONS

- A. Coordinate casework installation with size, location and installation of service utilities.
- B. Coordinate layout and installation of blocking and reinforcement in walls for support of casework.
- C. Field Measurements: Where woodwork is indicated to fit to other construction, verify actual dimensions of other construction by accurate field measurements before fabrication of woodwork; and indicate measurements on final Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.
 - 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.
- D. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
- E. Do not deliver product until the following conditions are met:
 - 1. Windows and doors are installed and the building is secure and weathertight.
 - 2. Ceiling, overhead ductwork and lights are installed.
 - 3. All painting is completed and floor tile is installed.
- F. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

1.10 SCOPE OF THE CASEWORK SUPPLIER/INSTALLER

- A. Casework and accessories: Furnish to building, and unpad and/or uncrate, set in place, level and fasten all specified casework and equipment.
- B. Clean up: Remove debris, dirt, and rubbish accumulated as a result of delivery of this equipment and leave premises broom clean and orderly.
- C. ADA-Americans With Disabilities Act Requirements: The following special requirements shall be met, where specifically indicated on architectural plans as "ADA," at public spaces or by General Note. To be in compliance with Federal Register Volume 56, No. 144, Rules and Regulations:
 - 1. Countertop height: with or without cabinet below, not to exceed a height of 34 inches A.F.F., (Above Finished Floor), at a surface depth of 24 inches.

2. Kneespace clearance: to be a minimum 27 inches A.F.F., and 30 inches clear span width. $\frac{3}{4}$ " inch deep shelving, adjustable or fixed: not to exceed a range from 9 inches A.F.F. to 54 inches A.F.F.
 3. Sink cabinet clearances: in addition to F.1., 2. above, upper kneespace frontal depth to be no less than 8 inches, and lower toe frontal depth to be no less than 11 inches, at a point 9 inches A.F.F.
- D. Fillers, scribes, access holes: Provide all necessary fillers and scribes for a complete job. Provide all access holes in cabinets and countertops required by mechanical, electrical, and HVAC contractors.

1.11 SCOPE NOT COVERED BY CASEWORK SUPPLIER/INSTALLER

- A. Service to and within equipment: Furnishing piping system, traps, drain lines, and conduit within equipment, in service turrets or tunnels, through, under or along backs of working surfaces and in reagent racks above countertops.
- B. Setting of plumbing fixtures and accessory fixtures, and final connections of such.
- C. Plumbing services: Furnishing, installation and connection of traps, drain lines, drop-in sinks, vents, steam fittings and special plumbing fixtures or piping to meet local codes, whether or not specifically called for in the contract documents.
- D. Electrical services: Furnishing and installation of rigid and flexible conduit, fittings, and special electrical equipment and accessories, wire, pulling of wire, and wiring and connection to electrical boxes, receptacles, switches, lights, and flush plates. Work shall be in accordance with local codes, whether or not specifically called for in the contract documents.
- E. Bracing and supports: Furnishing and installation of all framing and reinforcements of wall, floors and ceilings necessary to adequately support the equipment, and all bucks and plaster grounds required for proper installation of equipment. Casework supplier/installer to direct others as to the type of bracing required and the location needed.

PART 2 PRODUCTS

2.01 CABINETS

- A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Wood Veneer Faced Cabinet:
 1. Exposed Surfaces: HPVA HP-1 Grade AA, Red Oak, rift cut and comb grain, book-matched.
 2. Semi-Exposed Surfaces: HPVA HP-1 Grade A, Red Oak, rift cut and comb grain, book-matched.
 3. Concealed Surfaces: HPVA HP-1 Grade B, Red Oak, plain sliced, pleasing-matched.
 4. Door and Drawer Front Edge Profiles: Square edge with thin applied band matching face.
- C. Construction:
 1. Casework Construction Type: Type A - Frameless.
 2. Grained Face Layout for Cabinet and Door Fronts: Flush panel.
 - a. Premium Grade:
 - 1) Provide vertical run and match for doors, drawer fronts and false fronts within each cabinet unit.
 - 2) Provide well-matched doors, drawer fronts and false fronts across multiple cabinet faces in one elevation.
 3. Wood Veneer Paneling Cores: Provide the following cores depending on application:
 - a. Vertical Applications: Particleboard or MDF cores; Contractor's option.
 - b. Horizontal Applications (Countertop Substrates): Plywood core.
 4. Minimum core thicknesses for millwork components, unless otherwise indicated:
 - a. Concealed cabinet backs, drawer bodies, and drawer bottoms: 1/2 inch.
 - b. Drawer and door faces: 3/4 inch.
 - c. Exposed cabinet tops, bottoms, sides and related components: 3/4 inch.

- d. Countertop substrates: 2 layers of 3/4 inch.
- 5. Adjustable Shelf Loading: 40 psf.
 - a. Deflection: L/144.
- 6. Cabinet Style: Flush overlay.
- 7. Cabinet Doors and Drawer Fronts: Flush style.
- 8. Drawer Side Construction: Multiple-dovetailed.
- 9. Drawer Construction Technique: Lock shoulder joints.

2.02 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.

2.03 LUMBER MATERIALS

- A. Softwood Lumber: NIST PS 20; Graded in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Grade II/Custom; average moisture content of 5-10 percent; species as follows:
 - 1. Concealed Surfaces: Species - contractors choice.

2.04 PANEL MATERIALS

- A. Medium Density Fiberboard (MDF): ANSI A208.2; type as specified in AWI/AWMAC Architectural Woodwork Quality Standards Illustrated; composed of wood fibers pressure bonded with marine-grade waterproof adhesive to suit application; sanded faces.
 - 1. No added urea-formaldehyde binder permitted.
- B. Particleboard: ANSI A208.1; Composed of wood chips, sawdust, or flakes of medium density, made with waterproof resin binders; of grade to suit application; unsanded faces.
 - 1. No added urea-formaldehyde binder permitted.
 - 2. Minimum Density: 45 pcf.
 - 3. Face Screw Holding Capacity: 247 pounds.
- C. Softwood Plywood, Not Exposed to View: Any face species, veneer core; PS 1 Grade A-B, glue type as recommended for application; thickness as indicated or as required by application
- D. Ballistic Barrier at Judges Bench: Material meeting Ballistic Classification HG4 Handgun – High (.44 Magnum) in accordance with ASTM F1233 or UL 752 Level 3.
 - 1. Basis of Design Product: ArmorCore Level 3 Bullet Resistant Fiberglass, 7/16 inch thick: www.armorcore.com.

2.05 COUNTERTOPS

- A. Natural Quartz and Resin Composite Countertops (SSM-3): Sheet or slab of natural quartz and plastic resin over continuous substrate.
 - 1. Flat Sheet Thickness: 2 cm, minimum, or as indicated in Drawings.
 - 2. Natural Quartz and Resin Composite Sheets, Slabs and Castings: Complying with ISFA 3-01 and NEMA LD 3; orthophthalic polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard stone fabrication tools; no surface coating; color and pattern consistent throughout thickness.
 - a. Manufacturers:
 - 1) Cambria Company LLC: www.cambriausa.com/#sle.
 - 2) Dal-Tile Corporation: www.daltile.com/#sle.
 - 3) LG Hausys America, Inc: www.lghausysusa.com/#sle.
 - 4) **BASIS OF DESIGN:** Terrazzo & Marble Supply Companies; Diresco Belgium Quartz, a brand of Diresco - North America: www.tmsupply.com/#sle.
 - 5) Wilsonart: www.wilsonart.com/#sle.
 - 6) Substitutions: See Section 01 6000 - Product Requirements.
 - b. Factory fabricate components to the greatest extent practical in sizes and shapes indicated; comply with NSI (DSDM).
 - c. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 - d. Finish on Exposed Surfaces: Polished.

- e. Color and Pattern: As indicated in Finish Schedule.
- 3. Exposed Edge Treatment: Built up to minimum 1-1/2 inch thick; edge profile as indicated on drawings.
- 4. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
- 5. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Premium Grade.

2.06 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Hardwood Edgebanding: Use solid hardwood edgebanding matching species, color, grain, and grade for exposed portions of cabinetry.
- C. Fasteners: Size and type to suit application.
- D. 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.
- E. Concealed Joint Fasteners: Threaded steel.
- F. Grommets: Standard plastic or painted metal grommets for cut-outs, in color as selected by Architect from manufacturer's full range.
 - 1. Furnish and install 1 grommets per 4 LF of worksurface, to be field located.
 - a. Verify final quantity with Architect.
 - 2. Product: "EDP3" manufactured by Doug Mockett and Co, Inc; or approved equivalent.
 - 3. Solid surface countertops to have holes cut in the shop, at locations as shown on drawings.
- G. Perforated Metal Panels at AV Cabinet: 18 gage steel, mill finish, with 1/16 inch diameter holes on 1/8 inch staggered pattern.
 - 1. Basis of Design: McNichols Item No. 1611181841: www.mcnichols.com.
 - 2. Field-Applied Finish: Paint as specified in Section 09 9000; color as selected by Architect.
- H. Adjustable Shelf Supports for adjustable shelving: Standard back-mounted system using surface mounted metal shelf standards and coordinated cantilevered shelf brackets, for nominal 1 inch spacing adjustments.
 - 1. Product: #80 standards with #180 brackets manufactured by Knape and Vogt.
 - 2. Finish: antique bronze.

2.07 HARDWARE

- A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.
- B. Adjustable Shelf Supports in Casework: Standard side-mounted system using recessed metal shelf standards or multiple holes for pin supports and coordinated self rests, antique bronze finish, for nominal 1 inch spacing adjustments.
 - 1. Product: 346ANO manufactured by Knape and Vogt.
- C. Drawer and Door Pulls: 5-inch nominal centers.
 - 1. Product: Berenson Elevate, 128 mm c-c Verona Bronze pull, or approved equal.
- D. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with satin finish.
 - 1. Small format interchangeable core
 - 2. Key removable in the locked and unlocked position.
 - 3. Locations: as indicated on Interior Elevations
- E. Drawer Slides:
 - 1. Type: Full extension with overtravel.
 - 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: www accuride.com.
 - b. Blum, Inc: www blum.com/#sle.
 - c. Grass America Inc: www grassusa.com.
 - d. Knappe & Vogt Manufacturing Company: www knapeandvogt.com.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- F. File Inserts: Hanging file folder frames for legal size folders; side-mount to drawers.
- G. Hinges: European style concealed self-closing type, bronze with satin finish.
1. Manufacturers:
 - a. Grass America Inc: www grassusa.com.
 - b. Hafele; www hafele.com
 - c. Hardware Resources: www hardwareresources.com.
 - d. Julius Blum, Inc: www blum.com.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- H. Wall Cleats: French cleats for stud wall partitions, with lower cleat fastened to wall and upper cleat fastened to millwork.
- I. Concealed panel clips: black plastic male-female fitting;
1. Product: Hafele Keku Push-in Fitting or approved equal; black plastic or finish to match hinges.

2.08 FABRICATION

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- B. Sub-Base: Provide separate 4 inch high sub-base constructed of plywood with water resistant glue.
- C. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- D. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- E. Solid Surfacing: Fabricate panels up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
- F. Matching Wood Grain: Comply with requirements of quality standard for specified Grade and as follows:
1. Run grain vertically at all panels.
 2. Provide center matched panels at each elevation.
- G. Fabricate countertops 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, or where otherwise noted..
 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
 4. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
- H. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and fixtures and fittings. Verify locations of cutouts from on-site dimensions. Fully finish exposed cut edges.

2.09 FACTORY/SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.
- C. Finish work in accordance with AWI/AWMA/WI (AWS) or AWMA/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:

1. Transparent:
 - a. System - 12, Polyurethane, Water-based.
 - b. Stain: Custom, as selected by Architect to match approved sample.
 - c. Sheen: Satin.

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) or AWMAC/WI (NAAWS) 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 and countertops.
- 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 and counter bases 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.
- H. Securely attach countertops to millwork using concealed fasteners. Make flat surfaces level; shim where required
- I. Install grommets in locations as directed by architect.
- J. Provide matching casework filler panel to occupy remaining space between casework and adjacent walls as necessary to accommodate for field dimensions.

3.03 INSTALLATION ITEMS BY TRADE CONTRACTOR

- A. Install plumbing and electrical service to and within equipment.
- B. Set plumbing fixtures and accessory fixtures, and make final connections of such.
- C. Complete wiring and connection to electrical boxes, receptacles, switches, lights, and flush plates. Work shall be in accordance with local codes, whether or not specifically called for in the contract documents.
- D. Close ends of units, splash aprons, shelves and bases with sealant.

3.04 ADJUSTING

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.05 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.
- B. Clean all materials provided under this section and all adjacent materials, which may have become soiled from this work.
- C. Wipe out millwork interiors and empty drawers of dirt and debris. Remove pencil marks and other blemishes from millwork surfaces.
- D. Remove foreign matter that could affect operation or appearance of hardware.
- E. Make final adjustments to drawers and doors. Doors shall swing freely. All doors shall be aligned both vertically and horizontally. Drawers shall open and close smoothly, without binding or excessive slide and play.

3.06 PROTECTION OF FINISHED WORK

- A. Do not permit finished casework to be exposed to continued construction activity.
- B. Cover with protective cover, taped to casework.
- C. Remove temporary protective cover at date of Substantial Completion.

END OF SECTION

**SECTION 07 8100
APPLIED FIRE PROTECTION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Applied fire protection of interior structural steel not exposed to damage or moisture.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. ASTM E605/E605M - Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.
- C. ASTM E736/E736M - Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.
- D. ASTM E759/E759M - Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members.
- E. ASTM E760/E760M - Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members.
- F. ASTM E859/E859M - Standard Test Method for Air Erosion of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.
- G. ASTM E937/E937M - Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.
- H. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with placement of hangers.
- B. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittals procedures.
- B. Product Data: Provide data indicating product characteristics, performance criteria, and limitations of use.
- C. Test Reports: Reports from reputable independent testing agencies for proposed products, indicating compliance with specified criteria, conducted under conditions similar to those on project, as follows:
 - 1. Bond strength.
 - 2. Bond impact.
 - 3. Compressive strength.
 - 4. Fire tests using substrate materials similar those on project.

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 approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened containers with identification labels and testing agency markings intact and legible.
- B. Store products in manufacturer's unopened packaging until ready for installation.

1. Store at temperatures not less than 50 degrees F (10 degrees C) in dry, protected area.
 2. Protect from freezing, and do not store in direct sunlight.
 3. Dispose of any materials that have come into contact with contaminants of any kind prior to application.
- C. Dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.08 FIELD CONDITIONS

- A. Do not apply fireproofing when temperature of substrate material and surrounding air is below 40 degrees F or when temperature is predicted to be below said temperature for 24 hours after application.
- B. Provide ventilation in areas to receive fireproofing during application and 24 hours afterward, to dry applied material.
- C. Provide temporary enclosure as required to control environmental conditions and to prevent spray from contaminating air.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a two year period after Date of Substantial Completion.
 1. Include coverage for fireproofing to remain free from cracking, checking, dusting, flaking, spalling, separation, and blistering.
 2. Reinstall or repair failures that occur within warranty period.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Applied Fire Protection:
 1. Carboline Company: www.carboline.com.
 2. GCP Applied Technologies: www.gcpat.com/sle.
 3. Isolatek International Corp: www.isolatek.com/#sle.
 4. Southwest Fireproofing Products Company: www.sfrm.com.
 5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 APPLIED FIRE PROTECTION ASSEMBLIES

- A. Provide assemblies to meet ratings as follows:
 1. Floor (2 Hour)

2.03 MATERIALS

- A. Sprayed Fire-Resistive Material for Interior Applications, Concealed: Manufacturer's standard factory mixed material, which when combined with water is capable of providing the indicated fire resistance, and conforming to the following requirements:
 1. Composition: Gypsum- or portland-cement based; not mineral-fiber-based.
 2. Asbestos: Provide products containing no detectable asbestos.
 3. Bond Strength: 150 pounds per square foot, minimum, when tested in accordance with ASTM E736/E736M when set and dry.
 4. Dry Density: Minimum average density of 15 lb/cu ft, with minimum individual density of any test sample of 14 lb/cu ft, when tested in accordance with ASTM E605/E605M.
 5. Compressive Strength: 8.33 pounds per square inch, minimum.
 6. Effect of Impact on Bonding: No cracking, spalling or delamination, when tested in accordance with ASTM E760/E760M.
 7. Corrosivity: No evidence of corrosion, when tested in accordance with ASTM E937/E937M.
 8. Air Erosion Resistance: Weight loss of 0.025 g/sq ft, maximum, when tested in accordance with ASTM E859/E859M after 24 hours.
 9. Surface Burning Characteristics: Maximum flame spread index of 0 (zero) and maximum smoke developed index of 0 (zero), when tested in accordance with ASTM E84.

10. Effect of Deflection: No cracking, spalling, or delamination, when tested in accordance with ASTM E759/E759M.
11. Fungal Resistance: No growth after 28 days when tested according to ASTM G21.
12. Manufacturers:
 - a. GCP Applied Technologies; Monokote MK-6: www.gcpat.com/#sle.
 - b. Isolatek CAFCO Blaze-Shield II or CAFCO 300 AC.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.04 ACCESSORIES

- A. Primer Adhesive: Of type recommended by fireproofing manufacturer.
- B. Fabrics, Lath, and Mesh: Of type recommended by fireproofing manufacturer for special conditions encountered.
- C. Water: Clean, potable.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive fireproofing.
- B. Verify that clips, hangers, supports, sleeves, and other items required to penetrate fireproofing are in place.
- C. Verify that ducts, piping, equipment, or other items that would interfere with application of fireproofing have not been installed.
- D. Verify that voids and cracks in substrate have been filled.
- E. Verify that projections have been removed where fireproofing will be exposed to view as a finish material.

3.02 PREPARATION

- A. Perform tests as recommended by fireproofing manufacturer in applications where adhesion of fireproofing to substrate is in question.
- B. Remove incompatible materials that could effect bond by scraping, brushing, scrubbing, or sandblasting.
- C. Prepare substrates to receive fireproofing in strict accordance with instructions of fireproofing manufacturer.
- D. Protect surfaces not scheduled for fireproofing and equipment from damage by overspray, fall-out, and dusting.
- E. Close off and seal duct work in areas where fireproofing is being applied.

3.03 APPLICATION

- A. Apply fireproofing in accordance with manufacturer's instructions.
- B. Apply fireproofing in uniform thickness and density as necessary to achieve required ratings.
 1. Spray-On: Provide as many passes as necessary to cover with monolithic blanket of uniform density and texture.

3.04 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 01 4000 - Quality Requirements.
- B. Inspect installed fireproofing after application and curing for integrity, prior to its concealment.
- C. Ensure that actual thicknesses, densities, and bond strengths meet requirements for specified ratings and requirements of authorities having jurisdiction (AHJ).
- D. Re-inspect the installed fireproofing for integrity of fire protection, after installation of subsequent Work. Patch and repair fireproofing where damaged by subsequent construction operations, including cosmetic repair of fireproofing visible from normally occupied areas of finished project.

3.05 CLEANING

- A. Remove excess material, overspray, droppings, and debris.
- B. Remove fireproofing from materials and surfaces not required to be fireproofed.

END OF SECTION

**SECTION 07 8400
FIRESTOPPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems.
- B. Firestopping of joints and penetrations in fire-resistance-rated and smoke-resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 01 7300 - Execution Requirements: Cutting and patching.
- C. Section 09 2116 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

1.03 REFERENCE STANDARDS

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems.
- C. ASTM E1966 - Standard Test Method for Fire Resistive Joint Systems.
- D. 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.
- E. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- F. ITS (DIR) - Directory of Listed Products.
- G. FM 4991 - Approval Standard for Firestop Contractors.
- H. FM (AG) - FM Approval Guide.
- I. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems.
- J. UL (FRD) - Fire Resistance Directory.

1.04 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals for submittal procedures.
- B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
- C. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- D. 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, ASTM E119, and ASTM E814.
 - 1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
 - 2. 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. Approved by Factory Mutual Research Corporation under FM 4991, or meeting any two of the following requirements:
 - 3. Verification of at least five satisfactorily completed projects of comparable size and type.
 - 4. Licensed by local authorities having jurisdiction (AHJ).

1.06 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/#sle.
 - 2. A/D Fire Protection Systems Inc: www.adfire.com/#sle.
 - 3. Hilti, Inc: www.us.hilti.com/#sle.
 - 4. Specified Technologies Inc: www.stifirestop.com/#sle.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

- A. Firestopping Materials: Any materials meeting requirements.
- B. Mold and Mildew Resistance: Provide firestopping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.
- C. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.
- D. Fire Ratings: Refer to drawings for required systems and ratings.

2.03 FIRESTOPPING, GENERAL

- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated.

2.04 MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specified diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
- E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

- H. Pillows/Bags: Reusable heat-expanding pillow/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. 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, and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
 - 2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
 - 3. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.05 FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. 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.
- B. 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.
- C. 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.

2.06 FIRESTOPPING SYSTEMS

- A. Firestopping:
 - 1. Fire Ratings: See drawings for required systems and ratings.
- B. Firestopping at Uninsulated Metallic Pipe and Conduit Penetrations, of diameter 4 inches or less: Any material meeting requirements.
 - 1. Available UL-Classified Systems: C-BJ-2001-2999 and W-L-2001-2999.
- C. Firestopping at Insulated Pipes, of diameter 4 inches or less: Any material meeting requirements.
 - 1. Available UL-Classified Systems: C-BJ-5001-5999 and W-L-5001-5999.
- D. Firestopping at Cable Tray Penetrations: Any material meeting requirements.
 - 1. Available UL-Classified Systems: W-L-4001-4999.
- E. Firestopping at Cable Penetrations, not in Conduit or Cable Tray: Any material meeting requirements.
 - 1. Available UL-Classified Systems: C-BJ-3001-3999, W-L-6001-6999 and W-L-3001-3999.
- F. Firestopping at Control Joints (without Penetrations): Any material meeting requirements.
 - 1. Available UL-Classified Systems: C-BJ-0001-0999 and W-L-0001-0999.
- G. Firestop Systems for Miscellaneous Penetrants: Any material meeting requirements.
 - 1. Available UL-Classified Systems: W-J-7001-7999 and W-L-7001-7999.
- H. Firestop Systems for Groupings of Penetrants: Any material meeting requirements.
 - 1. Available UL-Classified Systems: C-BJ-8001-8999 and W-L-8001-8999.

2.07 MIXING

- A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.
- B. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

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 arrest liquid material leakage.

3.03 COORDINATION

- A. Coordinate construction of openings, penetrations and construction joints to ensure that the fire stop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes or cut openings to accommodate through-penetration fire stop systems. Coordinate construction and sizing of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

3.04 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 authorities having jurisdiction.
- C. Install labeling required by code.

3.05 IDENTIFICATION

- A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, pre-printed vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:
 - 1. The words "Warning: Through Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address and phone number.
 - 3. Through-penetration firestop system designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Through-penetration firestop system manufacturer's name.
 - 6. Installer's name.

3.06 FIELD QUALITY CONTROL

- A. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

3.07 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.08 PROTECTION

- A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 9200
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.
- B. Section 07 8400 - Firestopping: Firestopping sealants.
- C. Section 09 3000 - Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.

1.03 REFERENCE STANDARDS

- A. ASTM C834 - Standard Specification for Latex Sealants.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
- C. ASTM C1193 - Standard Guide for Use of Joint Sealants.
- D. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.

1.04 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals for submittal procedures.
- B. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- E. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.
- F. Installation Log: Submit filled-out log for each length or instance of sealant installed.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.
- C. Installation Log Form: Include the following data fields, with known information filled out.
 - 1. Unique identification of each length or instance of sealant installed.
 - 2. Location on project.
 - 3. Substrates.
 - 4. Sealant used.
 - 5. Stated movement capability of sealant.

6. Primer to be used, or indicate no primer is used.
7. Size and actual backing material used.
8. Date of installation.
9. Name of installer.
10. Actual joint width; provide space to indicate maximum and minimum width.
11. Actual joint depth to face of backing material at centerline of joint.
12. Air temperature.

1.06 WARRANTY

- A. See Section 01 7700 - Closeout Procedures for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 JOINT SEALANT APPLICATIONS

- A. Scope:
 1. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. Joints between countertops and adjacent construction.
 - c. Joints between wood trim and adjacent construction.
 2. Do not seal the following types of joints:
 - a. Joints indicated to be treated with manufactured expansion joint cover, or some other type of sealing device.
 - b. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - c. Joints where installation of sealant is specified in another section.
 - d. Joints between suspended panel ceilings/grid and walls.
- B. Interior Joints: Use non-sag Acrylic emulsion latex sealant, unless otherwise indicated.

2.02 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products with acceptable levels of volatile organic compound (VOC) content; see Section 01 6116.

2.03 NONSAG JOINT SEALANTS

- A. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
 1. Color: Clear.
 2. Products:
 - a. Adfast USA Inc; ADSEAL KB 4800 Series: www.adfastcorp.com/#sle.
 - b. Everkem Diversified Products, Inc; TruSil 100: www.everkemproducts.com/#sle.
 - c. Pecora Corporation; Pecora 898 NST (Non-Staining Technology): www.pecora.com/#sle.
 - d. Sika Corporation; Sikasil GP: www.usa.sika.com/#sle.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- B. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
 1. Color: To be selected by Architect from manufacturer's standard range.
 2. Grade: ASTM C834; Grade 0 Degrees F (Minus 18 Degrees C).
 3. Products:
 - a. Master Builders Solutions; MasterSeal NP 520: www.master-builders-solutions.com/en-us/#sle.

- b. Sherwin-Williams Company; 850A Acrylic Latex Caulk:
www.sherwin-williams.com/#sle.
- c. Tremco Commercial Sealants & Waterproofing; Tremflex 834:
www.tremcosealants.com/#sle.
- d. Substitutions: See Section 01 6000 - Product Requirements.

2.04 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
 - 1. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
 - 2. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.
- B. Masking Tape: Self-adhesive, nonabsorbent, nonstaining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- C. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- D. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Acceptance of Surfaces and Conditions: Examine substrate surfaces to receive products and systems and associated Work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting Work within a particular area will be construed as acceptance of surface conditions.
- B. Verify that joints are ready to receive work.
- C. Verify that backing materials are compatible with sealants.
- D. Verify that backer rods are of the correct size.

3.02 PREPARATION

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work. Provide smooth and clean substrates, free of dust, dirt, and moisture according to manufacturer's written instructions.
- B. Remove loose materials and foreign matter that could impair adhesion of sealant.
- C. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- D. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- E. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

- A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Provide joint sealant installations complying with ASTM C1193.
- C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- D. Install bond breaker backing tape where backer rod cannot be used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

- F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

END OF SECTION

SECTION 08 1433
STILE AND RAIL WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wood doors, stile and rail design:
 - 1. Standard-size man-doors, pre-hung.
 - 2. Custom-size restroom stall doors.
- B. Panels of wood and louvers.

1.02 RELATED REQUIREMENTS

- A. Section 06 2000 - Finish Carpentry: Wood door trim, stain color selection and approval.
- B. Section 08 7100 - Door Hardware.
- C. Section 10 2113 - Toilet Compartments: coordination of size and hardware.

1.03 REFERENCE STANDARDS

- A. 2010 ADA Standards for Accessible Design- US DoJ Rev. Regulations for Titles II and III, Americans with Disabilities Act of 1990 as adopted by Iowa State Building Code 661-302.1
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards.
- C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0.

1.04 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals for submittal procedures.
- B. Product Data: Indicate stile and rail core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria, factory finishing criteria, identify cutouts for glazing and louvers.
- D. Samples: Submit two samples of door veneer, 6x6 inch in size illustrating wood grain, stain color, and sheen.
 - 1. Resubmit until a stain color is approved by architect.
- E. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver, and store doors in accordance with quality standard specified.
- B. Accept doors on site in manufacturer's packaging, and inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

1.07 WARRANTY

- A. See Section 01 7700 - Closeout Submittals for additional warranty requirements.
- B. Interior Doors: Provide manufacturer's warranty for 5 years.
- C. Include coverage for warping beyond specified installation tolerances and defective materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Stile and Rail Wood Doors:

1. Algoma; www.algomahardwoods.com
2. Eggers Industries: www.eggersindustries.com.
3. Jeld-wen: www.jeld-wen.com
4. Marshfield DoorSystems, Inc: www.marshfielddoors.com.
5. VT Industries, Inc: www.vtindustries.com/#sle.
6. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DOORS

- A. Quality Level: Premium Grade, in accordance with AWI/AWMAC/WI Architectural Woodwork Standards.
- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; solid lumber construction; mortised and tenoned joints.
- C. Wood veneer facing with factory transparent finish, custom color to match existing.
- D. Design Style/Pattern: as indicated in Drawings.

2.03 DOOR AND PANEL FACINGS

- A. Veneer Facing for Transparent Finish: Red Oak, HPVA Grade AA, rift cut and comb grain, with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
 1. Pairs: Pair match each pair; set match pairs within 10 feet of each other when doors are closed.
- B. Adhesive: Type I - Waterproof.

2.04 DOOR CONSTRUCTION

- A. Vertical Exposed Edge of Stiles: Of same species as veneer facing.
- B. Fit door edge trim to edge of stiles after applying veneer facing.
- C. Panels: Raised, 2-ply solid wood, ogee sticking profile.
- D. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.
- E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- F. Low-Emitting Materials: Provide doors made with adhesives and wood products that comply with the Composite Wood Evaluation requirements described in Section 01 6116 Volatile Organic Compound (VOC) Content Restrictions.

2.05 FINISHES

- A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 1. Transparent:
 - a. System - 12, Polyurethane, Water-based.
 - b. Stain: Custom, as selected by Architect, to match approved sample.
 - c. Sheen: Satin.
- B. Factory finish doors in accordance with approved sample.
- C. Seal door top edge with color sealer to match door facing.

2.06 ACCESSORIES

- A. Wood Door Frames: See Section 06 2000.
- B. Panel or Glass Retention Molding: Wood of same species as door facing, inset molding, with mitered corners; prepared for countersink style screws.
- C. Door Hardware: See Section 08 7100.
- D. Wood Louvers: Wood, of same species as door facing, flat style, and at least 50 percent louver free area.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out of tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standards.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Adjust width of non-rated doors by cutting equally on both jamb edges.
- D. Trim door height by cutting bottom edges to a maximum of 3/4 inch.
- E. Machine cut for hardware.
- F. Coordinate installation of doors with installation of frames and hardware.

3.03 TOLERANCES

- A. Comply with specified quality standard for fit, clearance, and joinery tolerances.
- B. Maximum Width Distortion (Cup): 1/8 inch measured with straight edge or taut string, edge to edge, over an imaginary 36 by 84 inch surface area.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.

3.05 SCHEDULE

- A. See Door and Frame Schedule in the Drawings.

END OF SECTION

SECTION 08 3100
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Access units, wall- or ceiling-mounted.

1.02 RELATED REQUIREMENTS

- A. Section 08 7100 - Door Hardware: Mortise cylinder and core hardware.
- B. Section 09 2116 - Gypsum Board Assemblies: framing of rough opening, substrate.
- C. Section 09 2400 - Cement Plastering; framing of rough opening, substrate.
- D. Section 09 9000 - Painting and Coating: Field paint finish.

1.03 REFERENCE STANDARDS

- A. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
- B. 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.

1.04 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Schedule: List of wall or ceiling access doors required, per room, with quantity and sizes of each.
- D. Project Record Documents: Record actual locations of each access unit.

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 COORDINATION

- A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed equipment, and indicate on schedule specified in "Submittals" Article.

PART 2 PRODUCTS

2.01 WALL & CEILING-MOUNTED UNITS

- A. Manufacturers:
 - 1. ACUDOR Products Inc: www.acudor.com/#sle.
 - 2. Babcock-Davis: www.babcockdavis.com.
 - 3. Cendrex, Inc: www.cendrex.com/#sle.
 - 4. J. L. Industries, Inc: www.jlindustries.com.
 - 5. Karp Associates, Inc: www.karpinc.com.
 - 6. Larsen's Manufacturing Co.
 - 7. Milcor, Inc: www.milcorinc.com.
 - 8. Nystrom, Inc: www.nystrom.com/sle.
 - 9. Substitutions: See Section 01 6000 - Product Requirements.
- B. Wall and Ceiling Mounted Units: Factory fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
 - 1. Material: Steel.
 - 2. Style: exposed frame when cut into existing construction, "mud-in" for new walls:

3. Door Style: Single thickness with rolled or turned in edges.
4. Frames: 16 gauge, 0.0598 inch, minimum thickness.
5. Single Steel Sheet Door Panels: 1/16 inch, minimum thickness.
6. Steel Finish: Primed.
7. Size: 16 x16 inch, minimum, or as required for access. Coordinate with Owner and Trade Contractor with component to be accessed.
8. Hardware:
 - a. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.175 degree with non-removable pin.
 - b. Handle: No handle.
 - c. Latch/Lock: Cylinder lock-operated cam latch, two keys for each unit.
 - 1) Mortise cylinder and core as specified in Section 08 7100.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings are correctly sized and located.
- B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Advise installers of other work about specific requirements relating to access door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to proceeding with this work.
- B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

3.03 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Install access doors in gypsum board walls before joints are taped and finished, or arrange for taping and mudding of access door flanges after installation.
- D. Position units to provide convenient access to concealed equipment when necessary.

3.04 ADJUSTING AND CLEANING

- A. Adjust doors and hardware after installation for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION

**SECTION 087100
DOOR HARDWARE**

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes commercial door hardware for the following:
 - 1. Swinging doors.
- B. Door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
 - 2. Electromechanical door hardware.
 - 3. Cylinders specified for doors in other sections.
- C. Related Sections:
 - 1. Division 08 Section "Hollow Metal Doors and Frames".
 - 2. Division 08 Section "Flush Wood Doors".
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC - International Building Code.
 - 3. NFPA 70 - National Electrical Code.
 - 4. NFPA 80 - Fire Doors and Windows.
 - 5. NFPA 101 - Life Safety Code.
 - 6. NFPA 105 - Installation of Smoke Door Assemblies.
 - 7. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
 - 1. ANSI/BHMA Certified Product Standards - A156 Series.
 - 2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
 - 3. ANSI/UL 294 - Access Control System Units.
 - 4. UL 305 - Panic Hardware.
 - 5. ANSI/UL 437- Key Locks.

1.2 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - h. Warranty information for each product.
 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Shop Drawings: Details of electrified access control hardware indicating the following:
1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
 - a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
 - b. Complete (risers, point-to-point) access control system block wiring diagrams.
 - c. Wiring instructions for each electronic component scheduled herein.
 2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.
- D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

- E. Informational Submittals:
 - 1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

1.3 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
 - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
 - 2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
- F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
- G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
 - 1. Function of building, purpose of each area and degree of security required.
 - 2. Plans for existing and future key system expansion.
 - 3. Requirements for key control storage and software.
 - 4. Installation of permanent keys, cylinder cores and software.
 - 5. Address and requirements for delivery of keys.

- H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
 - 1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
 - 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 - 3. Review sequence of operation narratives for each unique access controlled opening.
 - 4. Review and finalize construction schedule and verify availability of materials.
 - 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.5 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.6 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of the hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
 - 1. Ten years for mortise locks and latches.
 - 2. Five years for exit hardware.
 - 3. Twenty five years for manual overhead door closer bodies.
 - 4. Two years for electromechanical door hardware, unless noted otherwise.

1.7 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
1. Quantity: Provide the following hinge quantity:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
 4. Hinge Options: Comply with the following:
 - a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
 5. Manufacturers:
 - a. McKinney (MK).
 - b. Stanley Hardware (ST).

2.3 POWER TRANSFER DEVICES

- A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
1. Manufacturers:
 - a. Pemko (PE) - EL-CEPT Series.
 - b. Securitron (SU) - EL-CEPT Series.
- B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-

door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:
 - a. McKinney (MK) - Electrical Connecting Kit: QC-R001.
 - b. McKinney (MK) - Connector Hand Tool: QC-R003.
2. Manufacturers:
 - a. McKinney (MK) - QC-C Series.

2.4 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.
 1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
 2. Furnish dust proof strikes for bottom bolts.
 3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
 4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
 5. Manufacturers:
 - a. Rockwood (RO).
 - b. Trimco (TC).
- B. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
 1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
 2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
 3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
 4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
 5. Manufacturers:
 - a. Rockwood (RO).
 - b. Trimco (TC).

2.5 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.
1. Manufacturers:
 - a. Sargent Manufacturing (SA) - 8200 Series.
 - b. No Substitution – Facility Standard.

2.6 ELECTROMECHANICAL LOCKING DEVICES

- A. Electromechanical Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed, subject to same compliance standards and requirements as mechanical mortise locksets, electrified locksets to be of type and design as specified below and in the hardware sets.
1. Electrified Lock Options: Where indicated in the Hardware Sets, provide electrified options including: outside door lock/unlock trim control, latchbolt and lock/unlock status monitoring, deadbolt monitoring, and request-to-exit signaling. Support end-of-line resistors contained within the lock case. Unless otherwise indicated, provide electrified locksets standard as fail secure.
 2. Energy Efficient Design: Provide lock bodies which have a holding current draw of 15mA maximum, and can operate on either 12 or 24 volts. Locks are to be field configurable for fail safe or fail secure operation.
 3. Manufacturers:
 - a. Sargent Manufacturing (SA) - 8200 Series.
 - b. No Substitution – Facility Standard.

2.7 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
 4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.
- B. Standards: Comply with the following:
1. Strikes for Mortise Locks and Latches: BHMA A156.13.
 2. Strikes for Bored Locks and Latches: BHMA A156.2.

3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.8 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
5. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
 - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
 - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
6. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
7. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
8. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
9. Rail Sizing: Provide exit device rails factory sized for proper door width application.
10. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.

1. Manufacturers:

- a. Sargent Manufacturing (SA) - 80 Series.
- b. No Substitution – Facility Standard.

2.9 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.

1. Manufacturers:
 - a. Sargent Manufacturing (SA) - 281 Series.
 - b. No Substitution – Facility Standard.

2.10 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width

and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
 - a. Stainless Steel: 300 grade, 050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
 - a. Rockwood (RO).
 - b. Trimco (TC).

2.11 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 1. Manufacturers:
 - a. Rockwood (RO).
 - b. Trimco (TC).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
 1. Manufacturers:
 - a. Norton Rixson (RF).
 - b. Sargent Manufacturing (SA).

2.12 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and

provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
 - 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
 - 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
 - 1. Pemko (PE).
 - 2. Reese Enterprises, Inc. (RE).

2.13 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.14 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
 - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
 - 1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
 - 1. Quantities listed are for each pair of doors, or for each single door.
 - 2. The supplier is responsible for handing and sizing all products.

3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Manufacturer's Abbreviations:

1. MK - McKinney
2. RO - Rockwood
3. SA - SARGENT
4. OT - Other
5. HS - HES
6. RF - Rixson
7. PE - Pemko
8. AK - Alarm Controls
9. SU - Securitron

Hardware Sets

Set: 1.0

Doors: [02J](#)

6 Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US10BE	MK
2 Flush Bolt	555	US10BE	RO
1 Dust Proof Strike	570	US10BE	RO
1 Storeroom Lock	LC 8204 LSL	US10BE	SA
1 Cylinder	Provided by Owner		OT
2 Surf Overhead Stop	9-x36	613E	RF
2 Silencer	608-RKW		RO

Set: 2.0

Doors: [02H](#), [02HH](#)

4 Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2"	US10BE	MK
1 Rim Exit Device, Passage	12 8815 ETL	US10BE	SA
1 Surface Closer	281 O	EB	SA
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US10BE	RO
1 Gasketing	S88D		PE

Set: 3.0

Doors: [021E](#), [022C](#), [022D](#), [022E](#), [02D](#)

3 Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2"	US10BE	MK
1 Fail Secure Lock	LC RX 8271 LSL	US10BE	SA
1 Cylinder	Provided by Owner		OT
1 Surface Closer	281 O	EB	SA
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US10BE	RO
1 Wall Stop	400	US10BE	RO
3 Silencer	608-RKW		RO
1 ElectroLynx Harness	QC-C1500P (Frame - EPT to Power/Controller)		MK
1 ElectroLynx Harness	QC-CxxxP (Door - EPT to Elec. Lock)		MK
1 Electric Power Transfer	EL-CEPT	613E	SU

Notes: Door normally closed, latched and secure.
Entry by valid card read or key override.
Free egress at all times.

Set: 4.0

Doors: 023C, 023D, 02C, 02E

4 Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2"	US10BE	MK
1 Storeroom Lock	LC 8204 LSL	US10BE	SA
1 Electric Strike	1006CLB	613E	HS
2 Push Plate	70C-RKW	US10BE	RO
1 Surf Overhead Stop	9-x36	613E	RF
1 Surface Closer	281 O	EB	SA
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US10BE	RO
3 Silencer	608-RKW		RO
1 ElectroLynx Harness	QC-C1500P (Frame - EPT to Power/Controller)		MK

Notes: Door normally closed, latched and secure.
Entry by valid card read or key override.
Free egress at all times.

Contractor to prep existing door and frame for new hardware. Use push plates to cover up existing holes not covered by new hardware.

Set: 4.1

Doors: 02

3 Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2"	US10BE	MK
1 Storeroom Lock	LC 8204 LSL	US10BE	SA
1 Electric Strike	1006CLB	613E	HS
2 Push Plate	70C-RKW	US10BE	RO

1 Surface Closer	281 CPS	EB	SA
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US10BE	RO
3 Silencer	608-RKW		RO
1 ElectroLynx Harness	QC-C1500P (Frame - EPT to Power/Controller)		MK

Notes: Door normally closed, latched and secure.
Entry by valid card read or key override.
Free egress at all times.

Contractor to prep existing door and frame for new hardware. Use push plates to cover up existing holes not covered by new hardware.

Set: 5.0

Doors: 021C, 021D

3 Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2"	US10BE	MK
1 Fail Secure Lock	LC RX 8271 LSL	US10BE	SA
1 Surf Overhead Stop	9-x36	613E	RF
1 Surface Closer	281 O	EB	SA
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US10BE	RO
3 Silencer	608-RKW		RO
1 ElectroLynx Harness	QC-C1500P (Frame - EPT to Power/Controller)		MK
1 ElectroLynx Harness	QC-CxxxP (Door - EPT to Elec. Lock)		MK
1 Electric Power Transfer	EL-CEPT	613E	SU

Notes: Door normally closed, latched and secure.
Entry by valid card read or key override.
Free egress at all times.

Set: 6.0

Doors: 02F, 02G

4 Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2"	US10BE	MK
1 Push Plate	70C-RKW	US10BE	RO
1 Pull Plate	BF 111x70C	US10BE	RO
1 Surface Closer	281 O	EB	SA
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US10BE	RO
1 Wall Stop	400	US10BE	RO
3 Silencer	608-RKW		RO

Mark	Hardware
02	4.1
02C	4.0
02D	3.0
02E	4.0
02F	6.0

02G	6.0
02H	2.0
02HH	2.0
02J	1.0
021C	5.0
021D	5.0

021E	3.0
022C	3.0
022D	3.0
022E	3.0
023C	4.0
023D	4.0

END OF SECTION 087100

SECTION 08 8000

GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior glazing units.
- B. Plastic films, for existing restroom windows.
- C. Glazing compounds.

1.02 RELATED REQUIREMENTS

- A. Section 06 2000 - Finish Carpentry: custom frames for glazing at attendance station with requirement for glass.
- B. Section 07 9200 - Joint Sealants: Sealants for other than glazing purposes.
- C. Section 08 1433 - Stile and Rail Wood Doors: Glazed lites in doors.

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.
- C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
- E. ASTM C1036 - Standard Specification for Flat Glass.
- F. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
- G. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass.
- H. ASTM C1193 - Standard Guide for Use of Joint Sealants.
- I. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.
- J. GANA (GM) - GANA Glazing Manual.
- K. GANA (SM) - GANA Sealant Manual.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by each of the affected installers.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data on Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
- D. Samples: Submit two samples 12 by 12 inch in size of plastic film.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA (GM) and GANA (SM) for glazing installation methods.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.

1.07 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.08 WARRANTY

- A. See Section 01 7700 - Closeout Submittals for additional warranty requirements.
- B. Laminated Glass: Provide a five (5) year manufacturer warranty to include coverage for delamination, including providing products to replace failed units.

PART 2 PRODUCTS

2.01 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
 - 1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
 - 2. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
 - 3. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
 - 4. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
 - 5. Patterned Glass Type: ASTM C1036, Type II - Patterned Flat Glass, Quality - Q5, Form 3 - Patterned glass, with color and performance characteristics as indicated.
- B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
 - 1. Laminated Safety Glass: Complies with ANSI Z97.1 - Class B or 16 CFR 1201 - Category I impact test requirements.

2.02 GLAZING UNITS

- A. Monolithic Interior Vision Glazing (TG):
 - 1. Applications: Interior glazing unless otherwise indicated.
 - 2. Glass Type: Fully tempered float glass.
 - 3. Tint: Clear.
 - 4. Thickness: 1/4 inch, nominal.
 - 5. Glazing Method: Dry glazing method, gasket glazing.
- B. Monolithic Interior Vision Glazing:
 - 1. Applications: Court Attendant counter.
 - 2. Glass Type: Laminated float glass.
 - 3. Tint: Clear, with clear interlayer.
 - 4. Thickness: 1/4 inch, nominal.
 - 5. Exposed edges shall be ground and chamfered.
 - 6. Glazing Method: Dry glazing method, gasket glazing.
- C. Patterned Glazing (PG): Textured or rolled glass.
 - 1. Applications: Locations as indicated on drawings.
 - 2. Glass Patterns: "Gothic".
 - 3. Tint: Clear.
 - 4. Glass Type: Fully tempered.
 - 5. Thickness: 5 mm
 - 6. Glazing Method: Dry glazing method, gasket glazing.
 - 7. Manufacturers:
 - a. Bendheim: EcoGlass; www.bendheim.com
 - b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 PLASTIC FILMS

- A. Decorative Plastic Film: Polyester or vinyl type.
 - 1. Application: Locations as indicated on drawings (restroom windows).
 - 2. Series/Color Type: as selected by Architect from manufacturer's full range.

3. Manufacturers:
 - a. 3M Window Films: solutions.3m.com
 - b. Llumar, an Eastman Chemical Company; Decorative Window Film, Llumar:
www.llumar.com/#sle.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.04 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.
- C. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.
- D. Glazing Clips: Manufacturer's standard type.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that the minimum required face and edge clearances are being provided.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

3.02 PREPARATION

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
- C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
- D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.
- E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.
- F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

- A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.

- D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.05 INSTALLATION - PLASTIC FILM

- A. Install plastic film with adhesive, applied in accordance with film manufacturer's instructions.
- B. Place without air bubbles, creases or visible distortion.
- C. Install film tight to perimeter of glass and carefully trim film with razor sharp knife. Provide 1/16 inch to 1/8 inch gap at perimeter of glazed panel unless otherwise required. Do not score the glass.

3.06 CLEANING

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove nonpermanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.07 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.
- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

**SECTION 09 0190
MAINTENANCE OF FINISHES**

PART 1 GENERAL

1.01 SECTION INCLUDES:

- A. Refinishing of existing wood components.
- B. Patching substrates, including:
 - 1. Plaster patching and crack repair.

1.02 RELATED REQUIREMENTS:

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 06 2000 - Finish Carpentry: wood for replacing existing wood trim at Contractor's option to refinishing.
- C. Section 09 0160 - Maintenance of Marble
- D. Section 09 9000 - Painting and Coating: opaque paint systems
- E. Section 09 9300 - Staining and Transparent Finishing: wood stains and transparent finishes.

1.03 REFERENCES

- A. The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings. Washington D.C.: National Park Service, 1995. 5 August 2009.

1.04 SEQUENCING AND SCHEDULING

- A. Perform maintenance repainting in the following sequence, which includes work specified in this and other Sections:
 - 1. Dismantle existing surface-mounted objects and hardware except items indicated to remain in place. Tag items with location identification and protect.
 - 2. Verify that temporary protections have been installed.
 - 3. Examine condition of surfaces to be painted.
 - 4. Remove existing finish to the degree required for each substrate and surface condition of existing paint.
 - 5. Apply new finish system.
 - 6. Reinstall dismantled surface-mounted objects and hardware unless otherwise indicated.

1.05 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals for submittal procedures.
- B. Product Data: For each type of product.
 - 1. Include recommendations for product application and use (preferred in the form of a matrix/schedule)
 - 2. Include test data substantiating that products comply with requirements.
 - 3. Include VOC content
- C. Samples: For each type of paint system and each pattern, color, and gloss; in sizes indicated below.
 - 1. Include stepped Samples defining each separate coat, including fillers and primers. Resubmit until each required sheen, color, and texture is achieved.
 - 2. For each painted color being matched to a standardized color-coding system, include the color chips from the color-coding-system company with Samples.
 - 3. Include a list of materials for each coat of each Sample.
 - 4. Label each Sample for location and application.
 - 5. Sample Size:
 - a. Painted Surfaces: 4-by-8-inch (100-by-200-mm) Samples for each color and material, on hardboard.
 - b. Stained or Natural Wood: 12-by-12-inch (300-by-300-mm) Samples of natural- or stained-wood finish, on representative <Insert required species of wood> surfaces.

1.06 QUALITY ASSURANCE

- A. Color Matching: Custom computer-match paint colors to colors indicated.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of experience.
- D. Mockups: Prepare mockups of maintenance repainting processes for each type of coating system and substrate indicated and each color and finish required to demonstrate aesthetic effects and to set quality standards for materials and execution. Duplicate appearance of approved Sample submittals.
 - 1. Locate mockups on existing surfaces where directed by Architect and in locations that enable viewing under same conditions as the completed Work.
 - 2. Refinishing Mockups: On existing surfaces using applicable specified methods of cleaning and other surface preparation, provide mockup sample of each type of window, door or running trim.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste daily.

1.08 FIELD CONDITIONS

- A. Existing Conditions: Determine that surfaces to which finishes are to be applied are even, smooth, sound, clean, dry and free from defects affecting proper application. Correct or report defective surfaces to Architect.
- B. Store materials in area of installation for minimum period of 24 hours prior to installation.

1.09 DEFINITIONS:

- A. Refinishing: the process in which existing finishes, including stains and sealers, are removed by stripping and/or sanding to get back to the original material.
- B. Stripping: the removal of existing finishes, including stains and sealers, by mechanical, chemical or heat methods.”

PART 2 PRODUCTS

2.01 PREPARATORY CLEANING MATERIALS

- A. Detergent Solution: Solution prepared by mixing 2 cups (0.5 L) of tetrasodium pyrophosphate (TSPP), 1/2 cup (125 mL) of laundry detergent that contains no ammonia, 5 quarts (5 L) of 5 percent sodium hypochlorite bleach, and 15 quarts (15 L) of warm water for every 5 gal. (20 L) of solution required.

2.02 FINISH REMOVERS

- A. Manufacturers:
 - 1. American Building Restoration Products Inc.
 - 2. Cathedral Stone Products, Inc.
 - 3. Diedrich Technologies, Inc.
 - 4. Dumond Chemicals, Inc.
 - 5. EaCo Chem, Inc.
 - 6. Hydroclean; Hydrochemical Techniques, Inc.

7. PROSOCO, Inc.
 8. Shore Corporation
 9. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Low-Odor, Solvent-Type Paste Paint Remover: Manufacturer's standard low-odor, water-rinsable, solvent-type paste, gel, or foamed emulsion formulation for removing paint from masonry, stone, wood, plaster, or metal as required to suit Project; and containing no methanol or methylene chloride.
- C. Solvent-Type Finish Remover: Manufacturer's standard water-rinsable, solvent-type paste or gel formulation for removing paint or stain from wood as required to suit Project.

2.03 EQUIPMENT

- A. Hand-held Orbital Sanders (NO ROTARY OR DISK SANDERS)
- B. Sandpaper: 3 grades, finest grade 100.

2.04 PATCHING MATERIALS

- A. Wood-Patching Compound: Two-part, epoxy-resin, wood-patching compound; knife-grade formulation as recommended in writing by manufacturer for type of wood repair indicated, tooling time required for the detail of work, and site conditions. Compound shall be designed for filling voids in damaged wood materials that have deteriorated from weathering and decay. Compound shall be capable of filling deep holes and spreading to feather edge.
- B. Wood Filler: Solvent base, tinted to match surface finish color.
- C. Bonding Compound: Provide type recommended for bonding plaster to solid surfaces, complying with ASTM C932.
- D. Reinforcing Mesh: 4.5 oz/sq yd alkali-resistant mesh.
- E. Plaster Materials: See Section 09 2400.

2.05 PAINT, STAIN, VARNISH, SEALER

- A. See Section 09 9000 - Painting and Coating for paint products and application.
- B. See Section 09 9300 - Staining and Transparent Finishing for stain and finish products and application.

PART 3 EXECUTION

3.01 PROTECTION

- A. Comply with each manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
 1. Cover adjacent surfaces with materials that are proven to resist chemical solutions being used unless the solutions will not damage adjacent surfaces. Use protective materials that are UV resistant and waterproof. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
 2. Neutralize and collect alkaline and acid wastes before disposal.

3.02 MAINTENANCE REPAINTING, GENERAL

- A. Maintenance Repainting Appearance Standard: Completed work is to have a uniform appearance as viewed by Architect from building interior at 5 feet (1.5 m) away from painted surface and from building exterior at 20 feet (6 m) away from painted surface.
 1. Completed work is to have a uniform appearance between new and existing woodwork.
 2. The design intent is to refinish all existing woodwork for uniform appearance, and to match architect approved sample. It is the Contractor's option to replace existing wood trim in lieu of refinishing.
- B. Execution of the Work: In repainting surfaces, disturb them as minimally as possible and as follows:

1. Remove failed coatings and corrosion and repaint.
 2. Verify that substrate surface conditions are suitable for repainting.
 3. Allow other trades to repair items in place before repainting.
- C. Mechanical Abrasion: Where mechanical abrasion is needed for the work, use gentle methods, such as scraping and lightly hand sanding, that will not abrade softer substrates, reducing clarity of detail.
- D. Heat Processes: Do not use torches, heat guns, or heat plates.

3.03 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for maintenance and repainting work.
- B. Maximum Moisture Content of Substrates: Do not begin application of coatings unless moisture content of exposed surface is below the maximum value recommended in writing by paint manufacturer and not greater than the following maximum values when measured with an electronic moisture meter appropriate to the substrate material:
1. Wood: 15 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. If existing surfaces cannot be prepared to an acceptable condition for proper finishing by using specified surface-preparation methods, notify Architect in writing.

3.04 PREPARATION

- A. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible, provide surface-applied protection before surface preparation and finishing.

3.05 PREPARATORY CLEANING

- A. General: Use the gentlest, appropriate method necessary to clean surfaces in preparation for refinishing. Clean all surfaces, corners, contours, and interstices.
- B. Detergent Cleaning: Wash surfaces by hand using clean rags, sponges, and soft bristle brushes. Rinse with water applied by clean rags or sponges.

3.06 PAINT REMOVAL

- A. General: Remove paint where indicated. Where cleaning methods have been attempted and further removal of the paint is required because of incompatible or unsatisfactory surfaces for repainting, remove paint to extent required by conditions.
1. Application: Apply paint removers according to paint-remover manufacturer's written instructions. Do not allow paint removers to remain on surface for periods longer than those indicated or recommended in writing by manufacturer.
 - a. Apply materials to all surfaces, corners, contours, and interstices, to provide a uniform final appearance without streaks.
 - b. After work is complete, remove protection no longer required. Remove tape and adhesive marks.
- B. Paint Removal with Solvent-Type Paste Paint Remover:
1. Apply thick coating of paint remover to dry, painted surface with natural-fiber cleaning brush, deep-nap roller, or large paintbrush. Apply in one or two coats according to manufacturer's written instructions.
 2. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
 3. Rinse with per manufacturer's recommendations to remove chemicals and paint residue.
 4. Use mechanical methods recommended in writing by manufacturer to remove chemicals and paint residue.

3.07 WOOD FINISH REMOVAL

- A. Apply finish remover to surfaces with natural-fiber cleaning brush, deep-nap roller, or large paint brush or as recommended in writing by manufacturer.
- B. Allow finish remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
- C. Scrape off finish and remover.
- D. Rinse with cold water to remove chemicals and residue.
- E. Use mechanical methods recommended in writing by manufacturer to remove remaining chemicals and finish residue.

3.08 SUBSTRATE REPAIR

- A. General: Repair substrate surface defects that are inconsistent with the surface appearance of adjacent materials and finishes.
- B. Wood Substrate:
 - 1. Repair wood defects including dents and gouges more than 1/8 inch (3 mm) in size and all holes and cracks by filling with wood-patching compound and sanding smooth. Reset or remove protruding fasteners.
 - 2. Where existing paint is allowed to remain, sand irregular buildup of paint, runs, and sags to achieve a uniformly smooth surface.
- C. Cementitious Material Substrate:
 - 1. General: Repair defects including dents and chips more than 1/4 inch (6 mm) in size and all holes and cracks by filling with cementitious patching compound and sanding smooth. Remove protruding fasteners.
 - 2. New and Bare Plaster: Neutralize surface of plaster with mild acid solution as recommended in writing by paint manufacturer. In lieu of acid neutralization, follow manufacturer's written instruction for primer or transition coat over alkaline plaster surfaces.
 - 3. Concrete, Cement Plaster, and Other Cementitious Products: Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. If surfaces are too alkaline to paint, correct this condition before painting.
- D. Gypsum-Plaster and Gypsum-Board Substrates:
 - 1. Repair defects including dents and chips more than 1/4 inch (6 mm) in size and all holes and cracks by filling with gypsum-plaster patching compound and sanding smooth. Remove protruding fasteners.
 - 2. Rout out surface cracks to remove loose, unsound material; fill with patching compound and sand smooth.
 - a. See paragraphs F and G for additional installation instructions.
- E. Metal Substrate:
 - 1. Preparation: Treat repair locations by wire-brushing and solvent cleaning. Use chemical or mechanical rust removal method to clean off rust.
 - 2. Defects in Metal Surfaces: Repair non-load-bearing defects in existing metal surfaces, including dents and gouges more than 1/8 inch (3 mm) deep or 1 inch (25 mm) across and all holes and cracks by filling with metal-patching compound and sanding smooth. Remove burrs and protruding fasteners.
 - 3. Priming: Prime iron and steel surfaces immediately after repair to prevent flash rusting. Stripe paint corners, crevices, bolts, welds, and sharp edges. Apply two coats to surfaces that are inaccessible after completion of the Work.
- F. Plaster patching:
 - 1. Scrape loose or damaged finish plaster and peeling paint from surface with chisel or joint knife. Remove material where required to enlarge cracks, chips, holes, etc. to at least 1/2 inch across and undercut to improve bonding of new material.
 - 2. Brush or vacuum surface to remove dust and debris.

3. Moisten the surface by lightly spraying a fine mist of clean water from a spray bottle.
 4. Apply skim finish coat over low areas to bring entire finished surface out flush with the projecting firm and sound layers of adjacent plaster or paint. Form plaster as required to match original configuration and design or ornamental plaster.
 5. Once dry, sand by hand to produce a surface without bumps, cracks or depressions, ready to receive finish treatment.
- G. Plaster crack repair:
1. Slightly widen the crack with a sharp, pointed tool like a crack widener or a triangular can opener.
 2. Brush or vacuum surface to remove dust and debris.
 3. Apply joint compound with a wide joint knife; Butter the compound into the crack, spreading it about 3 inches on either side of the crack.
 4. Center mesh reinforcing tape over the crack, and force the tape down into the bed of the joint compound with the knife; Remove any excess compound by wiping with the joint knife.
 5. When the tape is bedded, cover surface with a thin layer of compound and smooth as much as possible by working with the joint knife.
 6. When the first coat has dried (at least 24 hours), smooth out any ridges by "wet sanding" with a damp sponge or a heavy-nap cloth folded flat or wrapped around a suitable block.
 7. Apply a second thin coat of joint compound and feather the edge at least 1 inch beyond the first coat.
 8. After the second coat has dried, wet-sand lightly and apply a thin finishing coat.
 9. Lightly sand the surface again, and clean off the area with damp sponge.
 10. After the surface has dried, brush off any plaster residue or dust.

3.09 REFINISHING

- A. Mask off adjacent surfaces, including vertical surfaces, before beginning sanding.
- B. Sand to smooth even finish with no evidence of sander marks.
- C. Apply filler and stain and three finish coats.
 1. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.
 2. Apply stain to wood to obtain a finish to match the original.
 3. Lightly buff between coats with steel wool, vacuum clean and wipe with damp cloth before applying succeeding coat.
 4. Apply last coat of finish.

3.10 SURFACE-PREPARATION SCHEDULE

- A. General: Before painting, prepare surfaces for painting according to applicable requirements specified in this schedule.
 1. Examine surfaces to evaluate each surface condition according to paragraphs below.
 2. Where existing degree of soiling prevents examination, preclean surface and allow it to dry before making an evaluation.
 3. Repair substrate defects according to "Substrate Repair" Article.
- B. Surface Preparation for MPI DSD 0 Degree of Surface Degradation:
 1. Surface Condition: Existing paint film in good condition and tightly adhered.
 2. Paint Removal: Not required.
 3. Preparation for Painting: Wash surface by detergent cleaning; use solvent cleaning where needed. Roughen or degloss cleaned surfaces to ensure paint adhesion according to paint manufacturer's written instructions.
- C. Surface Preparation for MPI DSD 1 Degree of Surface Degradation:
 1. Surface Condition: Paint film cracked or broken but adhered.
 2. Paint Removal: Scrape by hand-tool cleaning methods to remove loose paint until only tightly adhered paint remains.

3. Preparation for Painting: Wash surface by detergent cleaning; use other cleaning methods for small areas of bare substrate if required. Roughen, degloss, and sand the cleaned surfaces to ensure paint adhesion and a smooth finish according to paint manufacturer's written instructions.
- D. Surface Preparation for MPI DSD 2 Degree of Surface Degradation:
1. Surface Condition: Paint film loose, flaking, or peeling.
 2. Paint Removal: Remove loose, flaking, or peeling paint film by hand-tool or chemical paint-removal methods.
 3. Preparation for Painting: Wash surface by detergent cleaning; use solvent cleaning where needed. Use other cleaning methods for small areas of bare substrate if required. Sand surfaces to smooth remaining paint film edges. Prepare bare cleaned surface to be painted according to paint manufacturer's written instructions for substrate construction materials.
- E. Surface Preparation for MPI DSD 3 Degree of Surface Degradation:
1. Surface Condition: Paint film severely deteriorated, obscuring fine architectural detail work because of paint-layer buildup or surface indicated to have paint completely removed.
 2. Paint Removal: Completely remove paint film by hand-tool or chemical paint-removal methods. Remove rust.
 3. Preparation for Painting: Prepare bare cleaned surface according to paint manufacturer's written instructions for substrate construction materials.
- F. Surface Preparation for MPI DSD 4 Degree of Surface Degradation:
1. Surface Condition: Missing material, small holes and openings, and deteriorated or corroded substrate.
 2. Substrate Preparation: Repair, replace, and treat substrate according to "Substrate Repair" Article.
 3. Preparation for Painting: Sand substrate surfaces to smooth remaining paint film edges and prepare according to paint manufacturer's written instructions for substrate construction materials. Remove rust.

END OF SECTION

SECTION 09 0561

COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section applies to floors identified in Contract Documents that are receiving the following types of floor coverings:
 - 1. Carpet tile.
 - 2. Thin-set ceramic tile.
- B. Preparation of new and existing concrete floor slabs for installation of floor coverings.
- C. Floor coatings.

1.02 DEFINITIONS

- A. MVE: Moisture Vapor Emission.
- B. MVER: Moisture Vapor Emission Rate; measured in lbs per1000 ft2 / 24 hours.
- C. RH: Relative Humidity; measured in percentage.
- D. VOC: Volatile Organic Compound; measured in grams/liter.
- E. CSP: Concrete Surface Profile defined by ICRI.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Meeting:
 - 1. Convene minimum two weeks prior to starting work of this section.
 - 2. Discuss contract document requirements, moisture tests, manufacturer recommendations, installer's recommendations, scheduling, and protection of work from damage by other trades.
 - 3. Attendance required by: Contractor, Floor Installer, Manufacturer's Representative, Independent testing agency, Concrete Subcontractor, Ready Mix supplier.
 - 4. Objective of conference is:
 - a. Review methods and procedures.
 - b. Tour job site representative areas to inspect and discuss condition of substrate.
 - c. Review concrete finishing requirements.
 - d. Review and finalize construction schedule to ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.
 - e. Review required inspections, testing, certifications, material usage procedures.
 - f. Review environmental restrictions and forecasts.
 - g. Confirm compatibility of MVE control coatings with other concrete chemicals specified.
 - h. Record content of conference including attendance and topics.
 - 5. Furnish record of pre-installation conference to all parties who are affected by MVE control systems work.

1.04 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals for submittal procedures.
- B. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
 - 1. Moisture and alkalinity (pH) limits and test methods.
 - 2. Manufacturer's required bond/compatibility test procedure.
- C. Product Data: Manufacturer's published data on each product to be used for remediation.
 - 1. Manufacturer's statement of compatibility with types of flooring applied over remedial product.
 - 2. Test reports indicating compliance with specified performance requirements, performed by nationally recognized independent testing agency.

3. Specimen Warranty: Copy of warranty to be issued by coating manufacturer and certificate of underwriter's coverage of warranty.

D. Installer's Qualification Statement.

1.05 QUALITY ASSURANCE

- A. Source Control: Supply all components of MVE Control System from single manufacturer.
- B. Remedial Coating Installer Qualifications: Company specializing in performing work of the type specified in this section, trained by or employed by coating manufacturer, and able to provide at least 3 project references showing at least 3 years' experience installing moisture emission coatings.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, handle, and protect products in accordance with manufacturer's instructions and recommendations.
- B. Deliver materials in manufacturer's packaging; include installation instructions.
- C. Keep materials from freezing.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
 1. Thickness: As required for application and in accordance with manufacturer's installation instructions.
 2. ASTM F3010 qualified, fluid-applied, two-component, 100 percent solids epoxy resin, low viscosity, penetrating, one-coat membrane forming system; formulated for application on concrete substrates to reduce MVER to level required for installation of floor covering indicated, including adhesives.
 3. Products:
 - a. Allied Construction Technologies, Inc. (ACTech), GoEarly Technology; www.actechperforms.com
 - b. ARDEX Engineered Cements; ARDEX MC RAPID: www.ardexamericas.com/#sle.
 - c. Custom Building Products; TechMVC Moisture Vapor and Alkalinity Barrier: www.custombuildingproducts.com/#sle.
 - d. H.B. Fuller Construction Products, Inc; TEC LiquiDam with TEC Level Set 200 SLU: www.tecspecialty.com/#sle.
 - e. ISE Logik: MVEC 710; www.iselogik.com
 - f. Koster American Corporation; Koster VAP 1 2000: www.kosterusa.com.
 - g. LATICRETE International, Inc; LATICRETE NXT Vapor Reduction Coating with LATICRETE NXT Level Plus: www.laticrete.com/#sle.
 - h. MAPEI Americas: Planiseal VS or VS Fast; www.mapei.com/US-EN
 - i. Maxxon Corporation: MVP; www.maxxoncorporation.com
 - j. Tnemec Company, Inc; Series 208 Epoxoprime MVT: www.tnemec.com/#sle.
 - k. UZIN UTZ NORTH AMERICA, INC; UZIN PE 460 with UZIN PE 280 and UZIN NC 170 LevelStar: <https://us.uzin.com/#sle>.
 - l. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

- A. Perform following operations in the order indicated:
 1. Preliminary cleaning.
 2. Patching, smoothing, and leveling, as required.
 3. Other preparation specified.

4. Protection.

3.02 PRELIMINARY CLEANING

- A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.
- B. Do not use solvents or other chemicals for cleaning.

3.03 PREPARATION

- A. See individual floor covering section(s) for additional requirements.
- B. Comply with requirements and recommendations of floor covering manufacturer.
- C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.
- D. Do not fill expansion joints, isolation joints, or other moving joints.

3.04 APPLICATION OF FLOOR COATING

- A. Comply with requirements and recommendations of coating manufacturer.

3.05 PROTECTION

- A. Cover prepared floors with building paper or other durable covering.

END OF SECTION

SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall and soffit framing.
- C. Metal channel ceiling framing.
- D. Concealed suspended grid ceiling framing.
- E. Acoustic insulation, acoustic sealant, and acoustic accessories.
- F. Gypsum wallboard.
- G. Non-metallic plaster lath (board).
- H. Joint treatment and accessories.
- I. Level 5 finish system.

1.02 DEFINITIONS

- A. Gypsum Board Construction Terminology: Refer to ASTM C11 for definitions of terms not defined in this Section or in other referenced quality standards.
- B. Damage: Stored or installed paper-faced gypsum board materials not specifically manufactured as "moisture-resistant products" shall be classified as defective and nonconforming Work if they have been exposed to wetness or dampness at any time prior to Substantial Completion or if they exhibit evidence of active or dormant mold or mildew.

1.03 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 06 1000 - Rough Carpentry: Wood blocking and sheathing.
- C. Section 07 0553 - Fire and Smoke Assembly Identification
- D. Section 07 8400 - Firestopping: Top-of-wall assemblies at fire-resistance-rated walls.
- E. Section 07 9200 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board Work.
- F. Section 09 2400 - Cement Plastering: assemblies requiring work of this section.

1.04 REFERENCE STANDARDS

- A. AISI SG-971 - Specification for the Design of Cold-Formed Steel Structural Members.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- C. ASTM C11 - Standard Terminology Relating to Gypsum and Related Building Materials and Systems; 2015a.
- D. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- E. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members.
- F. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- G. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
- H. ASTM C834 - Standard Specification for Latex Sealants; 2014
- I. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.

- J. 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.
- K. 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.
- L. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base.
- M. ASTM C1288 - Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets.
- N. ASTM C1325 - Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units.
- O. ASTM C1396/C1396M - Standard Specification for Gypsum Board.
- P. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
- Q. ASTM E72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
- R. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- S. ASTM E413 - Classification for Rating Sound Insulation.
- T. GA-216 - Application and Finishing of Gypsum Board.
- U. GA-600 - Fire Resistance Design Manual.
- V. UL (FRD) - Fire Resistance Directory.

1.05 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals for submittal procedures.
- B. Shop Drawings: Indicate special details associated with fireproofing, acoustic seals, and excessive heights of framing.
- 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.
- E. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

1.06 QUALITY ASSURANCE

- A. Perform in accordance with ASTM C 840. Comply with requirements of GA-600 for fire-rated assemblies.
- B. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum five years of experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

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 as indicated calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- C. Fire-Resistance-Rated Assemblies: Provide completed assemblies complying with applicable code.
 - 1. Gypsum Association File Numbers: Comply with requirements of GA-600 for the particular assembly; or
 - 2. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.02 METAL FRAMING MATERIALS

- A. Acceptable Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. California Expanded Metals Co. (CEMCO): www.cemcosteel.com.
 - 2. Clark Dietrich Building Systems LLC: www.clarkdietrich.com.
 - 3. USG Corporation; www.usg.com
 - 4. Custom Stud, Inc.: www.customstud.com.
 - 5. Marino: www.marinoware.com/#sle.
 - 6. Phillips Manufacturing Co: www.phillipsmfg.com/#sle.
 - 7. MBA Building Supplies, Inc: www.mbastuds.com.
 - 8. Studco Building Systems: www.studcosystems.com.
 - 9. Telling Industries: www.buildstrong.com.
 - 10. The Steel Network, Inc: www.SteelNetwork.com.
 - 11. Substitutions: See Section 01 6000 - Product Requirements.
- B. Non-Loadbearing Wall 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 typical wall framing of L/240 at 7.5 psf. Provide maximum deflection of L/360 at 7.5 psf for walls with tile facing.
 - 1. Minimum Metal Thickness: 20 gage (0.039 inch).
 - a. Exception: The minimum metal thickness and section properties requirements of ASTM C645 are waived provided steel of 40 ksi minimum yield strength is used, the metal is continuously dimpled, the effective thickness is at least twice the base metal thickness, and maximum stud heights are determined by testing in accordance with ASTM E72 using assemblies specified by ASTM C754.
 - 2. Studs: C-shaped with knurled or embossed faces.
 - 3. H-Studs: "H" shaped, 2 inches wide; 25 gage.
 - 4. Runners: "U" shaped, sized to match studs.
 - 5. Ceiling Channels: "C" shaped.
 - 6. Deflection Channels: Proprietary or non-proprietary deep leg tracks with slotted holes.
 - 7. Furring Channels: Hat-shaped sections, minimum depth of 7/8 inch with minimum 1-3/8 inch wide knurled mounting flange.
- C. 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-resistance-rated head of partition joint systems indicated on drawings.
 - 4. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-resistance rating of the wall assembly.
 - 5. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on Drawings; minimum track length of 12 feet.

- D. Non-structural Framing Accessories:
 - 1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
 - 2. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.
 - 3. Flexible Wood Backing: Fire-retardant-treated wood with sheet steel connectors.
 - a. Products:
 - 1) ClarkDietrich; Danback: www.clarkdietrich.com/#sle.
 - 2) Substitutions: See Section 01 6000 - Product Requirements.
- E. Concealed Suspended Grid Ceiling Framing System: ASTM C645, heavy-duty rating.
 - 1. Description: Manufacturer's standard direct hung suspended grid system composed of main beams and cross furring members that interlock to form a modular supporting network for application of gypsum board and acoustical panels.
 - 2. Protective Coating: ASTM A653/A653M, not less than G40, hot-dipped galvanized coating.
 - 3. Main Beams and Cross Tees: Inverted T-shaped profile of single or double mounting flange; minimum 1-1/2 inch profile height with top bulb and minimum 1-3/8 inch wide knurled mounting flange; factory punched for hanger wire, and to receive cross furring members.
 - 4. Hanger Wires: ASTM A641/A641M, Class 1, zinc-coated, soft annealed, mild steel wire; 0.1620 inch (8 gage) diameter.
 - 5. Acceptable Manufacturers and Products:
 - a. Armstrong World Industries Inc.; Drywall Grid System: www.armstrong.com.
 - b. Chicago Metallic Corporation; 640/660 Drywall Grid System: www.rockfon.com.
 - c. USG Corporation; Drywall Suspension System: www.usg.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- F. Framing Accessories: Framing manufacturer's standard connectors, bracings, brackets, clips, gussets, and other framing devices as required by conditions, formed from galvanized sheet steel complying with requirements of main support system.

2.03 BOARD MATERIALS

- A. Acceptable Manufacturers - Board Materials:
 - 1. American Gypsum Company: www.americangypsum.com/#sle.
 - 2. CertainTeed Corporation: www.certainteed.com/#sle.
 - 3. Georgia-Pacific Gypsum: www.gpgypsum.com/#sle.
 - 4. National Gypsum Company: www.nationalgypsum.com/#sle.
 - 5. USG Corporation: www.usg.com/#sle.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 - a. Not to be used for non-metallic plaster lath.
 - 2. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 - 3. Thickness: 5/8 inch, unless otherwise indicated.
 - a. Curved Surfaces: 1/4 inch or 3/8 inch; as required by radius
 - 4. Edges: Tapered.
 - 5. Paper-Faced Products:
 - a. American Gypsum Company; FireBloc Type X Gypsum Wallboard: www.americangypsum.com/#sle.
 - b. American Gypsum Company; FireBloc Type C Gypsum Wallboard: www.americangypsum.com/#sle.
 - c. CertainTeed Corporation; Type C Drywall: www.certainteed.com/#sle.
 - d. CertainTeed Corporation; Type X Drywall: www.certainteed.com/#sle.
 - e. Continental Building Products; Regular Drywall: www.continental-bp.com/#sle.

- f. Georgia-Pacific Gypsum; ToughRock Fireguard X: www.gpgypsum.com/#sle.
 - g. Georgia-Pacific Gypsum; ToughRock Fireguard C: www.gpgypsum.com/#sle.
 - h. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond Fire-Shield Gypsum Board: www.goldbondbuilding.com/#sle.
 - i. USG Corporation; Sheetrock Brand Firecode X Panels 5/8 in. (15.9 mm): www.usg.com/#sle.
 - j. Substitutions: See Section 01 6000 - Product Requirements.
6. Mold Resistant Paper Faced Products:
- a. American Gypsum Company; M-Bloc Type X: www.americangypsum.com/#sle.
 - b. American Gypsum Company; M-Bloc Type C: www.americangypsum.com/#sle.
 - c. CertainTeed Corporation; M2Tech 5/8" Type C Moisture & Mold Resistant Drywall: www.certainteed.com/#sle.
 - d. CertainTeed Corporation; M2Tech 5/8" Type X Moisture & Mold Resistant Drywall: www.certainteed.com/#sle.
 - e. Continental Building Products; Mold Defense: www.continental-bp.com/#sle.
 - f. Continental Building Products; Mold Defense Type X: www.continental-bp.com/#sle.
 - g. Georgia-Pacific Gypsum; ToughRock Mold-Guard: www.gpgypsum.com/#sle.
 - h. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold-Guard: www.gpgypsum.com/#sle.
 - i. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond XP Gypsum Board: www.goldbondbuilding.com/#sle.
 - j. USG Corporation; Sheetrock Brand EcoSmart Panels Mold Tough Firecode X 5/8 in. (15.9 mm): www.usg.com/#sle.
 - k. Substitutions: See Section 01 6000 - Product Requirements.
- C. Plaster Lath (Backer Board): One of the following products:
- 1. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 2. Gypsum-Based Board:
 - a. Thickness: 3/8 inch
 - b. Products:
 - 1) USG: Rocklath; www.usg.com
 - 2) Substitutions: See Section 01 6000 - Product Requirements.
 - 3. Cement-Based Board: Non-gypsum-based, cementitious board complying with ASTM C1288.
 - a. Thickness: 1/2 inch.
 - b. Products:
 - 1) James Hardie Building Products, Inc: www.jameshardie.com/#sle.
 - 2) Substitutions: See Section 01 6000 - Product Requirements.
- D. Tile Backer Board:
- 1. Glass-Mat-Faced Board (surfaces behind tile except as otherwise indicated): Coated glass mat water-resistant gypsum backing panel as defined in ASTM C 1178.
 - a. Regular Type: Thickness 1/2 inch.
 - b. Products:
 - 1) CertainTeed Corporation; 1/2" GlasRoc Tile Backer: www.certainteed.com/#sle.
 - 2) Georgia-Pacific Gypsum; DensShield Tile Backer: www.gpgypsum.com/#sle.
 - 3) Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond eXP Fire-Shield Tile Backer: www.goldbondbuilding.com/#sle.
 - 4) USG Corporation; Durock Brand Glass-Mat Tile Backerboard 1/2 in. (12.7 mm): www.usg.com/#sle.
 - 5) Substitutions: See Section 01 6000 - Product Requirements.

2.04 ACOUSTIC ACCESSORIES

- A. Acoustic Insulation: ASTM C665, Type I, Class A; preformed mineral fiber, friction fit type, unfaced.
- 1. Thickness: Minimum of 3-1/2 inches.

2. Density: Not less than nominal 2.5 pounds per cubic foot.
- B. Acoustic Sealant: ASTM C834; non-sag, paintable, non-staining acrylic emulsion latex or water-based elastomeric sealant that is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies per ASTM E90.
 1. Comply with Section 01 6116 Volatile Organic Compound (VOC) Content Restrictions

2.05 OTHER ACCESSORIES

- A. Low-Emitting Materials: Comply with requirements for wall board, joint compound, adhesives, and sealants described in Section 01 6116 Volatile Organic Compound (VOC) Content Restrictions.
- B. Finishing Accessories: ASTM C1047, galvanized steel, rolled zinc, or rigid plastic, unless noted otherwise.
 1. Types: As detailed on Drawings or required for finished appearance.
- C. J-Bead: rust proof, dent resistant PVC J-bead for finishing rough drywall ends where they can't be mudded-in.
 1. Trim-tex, Inc: J-Bead 1208; www.trim-tex.com.
- D. Fire-Rated Control Joint: composite control joint with intumescent tape factory applied to one side of the back of the control joint; hot-dipped galvanized steel complying with ASTM A653 and ASTM A1003.
 1. Product: Clark Dietrich: FAS-093X or approved equal.
- E. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 1. Fiberglass Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
 2. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
 3. Joint Compound: Drying type, vinyl-based, ready-mixed.
 4. Joint Compound: Setting type, field-mixed.
- F. Level 5 Finish Accessories: Contractor's option; one of the following:
 1. Skim Coat Finish / Surfacer: Lightweight joint compound formulated to reduce airborne dust when sanded.
 - a. Basis of Design: ProForm Lite Ready Mix Joint Compound with Dust-Tech manufactured by National Gypsum Company.
 2. High-Build Drywall Surfacer: 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.
 - a. Acceptable Manufacturers and Products:
 - 1) Level V Wall and Ceiling Primer/Surfacer manufactured by CertainTeed.
 - 2) Tuff-Hide Primer-Surfacer manufactured by USG.
 - 3) Builders Solution Interior Surfacer manufactured by Sherwin-Williams.
 - 4) Substitutions: See Section 01 6000 - Product Requirements.
- G. Screws for Attachment to Steel Members Less Than 0.03 inch in Thickness, to Wood Members, and to Gypsum Board: ASTM C1002; self-piercing tapping type; cadmium-plated for exterior locations.
- H. 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.
- I. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for Work of this Section to commence. Starting Work within a particular area will be construed as acceptance of surface conditions.

3.02 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions. Isolate gypsum board assemblies from building structure to prevent transfer of loading imposed by structural movement.
- B. Suspended Ceilings and Soffits: Space framing and furring members as permitted by standard.
 - 1. Level soffit system to a tolerance of 1/1200.
 - 2. Laterally brace entire suspension system.
 - 3. Install bracing as required at exterior locations to resist wind uplift.
- C. Studs: Space studs at 16 inches on center, unless specifically indicated otherwise.
 - 1. Extend partition framing to structure in all locations, except where partitions are indicated to terminate at, or immediately above, suspended ceilings.
 - a. 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.
 - 2. Continue stud framing over door frames and openings to provide support for gypsum board.
 - 3. Install studs so that flanges point in same direction. Do not lap studs.
 - 4. At intersections and corners, locate studs no more than 2 inches from partition intersections and corners and secure with screws through both flanges of studs and tracks.
 - 5. Install horizontal bridging at 48 inches on center vertically where indicated or required by installation quality standard.
- D. Openings: Reinforce openings using not less than double studs at jambs. Construct header of appropriate configuration for type of opening to be spanned and secure with clip angles.
- 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.
 - 1. Orientation: Vertical.
 - 2. Spacing: At 16 inches on center.
- F. Blocking: Install blocking for support of plumbing fixtures, wall cabinets, toilet accessories, and hardware. Bolt or screw steel channels to studs.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
 - 1. Place one bead continuously on substrate before installation of perimeter framing members.
 - 2. Place continuous bead at perimeter of each layer of gypsum board.
 - 3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

3.04 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. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

1. Exception: Tapered edges to receive joint treatment at right angles to framing.
- C. Double-Layer Non-Rated: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Use glass mat faced gypsum board at exterior walls and at other locations as indicated. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.
- D. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- E. Gypsum Board Installation on Metal Framing: Use screws for attachment of all gypsum board except face layer of non-rated double-layer acoustical assemblies, which may be installed by means of adhesive lamination.
 1. Partitions Terminating at Structure: Where partitions intersect open building structure members projecting below underside of floor slabs and roof decks, cut board to fit profile formed by decking, joists, beams, and other structural members; form proper annular joint to receive firestopping.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
 1. Not more than 30 linear feet apart in walls and ceilings.
 2. Where different substrates occur at walls and ceilings.
 3. Where control joints occur in substrates at walls and ceilings.
 4. Where walls and ceilings abut inside face of exterior walls.
 5. Where L, U, or T shaped ceiling configurations are joined.
 6. Where less than ceiling height door frames occur; extend control joints from top of frame up to ceiling at corner of hinge side of door.
 7. Where less than ceiling height window frames occur; extend control joints from top of frame up to ceiling and from bottom of frame to floor at both corners.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.06 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 1. Level 5:
 - a. Walls and ceilings to receive painted finish.
 - b. Surface of glass-mat-faced gypsum board scheduled for paint finish.
 - c. Walls to receive wall coverings, unless otherwise indicated.
 - d. Other areas specifically indicated.
 2. Level 3:
 - a. Mechanical, electrical, telephone and elevator equipment rooms
 - b. Stair towers
 3. Level 2:
 - a. Moisture resistant gypsum board used as substrate for ceramic tile
 4. Level 1:
 - a. Areas above ceilings
 - b. Substrate for wood paneling
 - c. Shell areas.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
 2. Taping, filling, and sanding are not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.
- D. Level 5 Finish: Contractor's option; one of the following where Level 5 finish is required.

1. Apply skim coat of lightweight ready-mix joint compound over entire surface of boards after joints have been properly treated; to achieve a flat and tool mark-free finish.
2. Spray-apply 2 coats of high-build drywall surfacer over entire surface of boards after joints have been properly treated; to achieve a flat and tool mark-free finish. Back roll after application of each coat.

3.07 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from true Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

**SECTION 09 2400
CEMENT PLASTERING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cement plastering.

1.02 RELATED REQUIREMENTS

- A. Section 07 9200 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.
- B. Section 09 2116 - Gypsum Board Assemblies: Metal stud framing, furring and board lath for plaster.

1.03 REFERENCE STANDARDS

- A. ASTM A924/A924M - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- B. ASTM C150/C150M - Standard Specification for Portland Cement.
- C. ASTM C206 - Standard Specification for Finishing Hydrated Lime.
- D. ASTM C897 - Standard Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters.
- E. ASTM C926 - Standard Specification for Application of Portland Cement-Based Plaster.
- F. ASTM C932 - Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering.
- G. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster.

1.04 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals for submittal procedures.
- B. Product Data: Provide data on plaster materials and trim accessories.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section.

1.06 FIELD CONDITIONS

- A. Interior Plaster Work: Maintain minimum ambient temperature of 50 degrees F during installation of plaster and until fully cured.

PART 2 PRODUCTS

2.01 CEMENT PLASTER APPLICATIONS

- A. Ceiling:
 - 1. Lath Plaster Base: Metal lath. on furring or suspended framing members.
 - a. Plaster Type: Jobsite mixed plaster.
 - b. Number of Coats: Two or more, as required to meet fire rating indicated.
 - c. Finish Coat Texture: manufacturer's standard to meet fire rating (fully concealed).
- B. Walls:
 - 1. Gypsum Lath Plaster Base: Non-metallic lath.
 - a. Plaster Type: Jobsite mixed plaster.
 - b. Number of Coats: Two (base and finish) minimum, or as required to match existing which is approximately 1 inch thick.
 - c. Finish Coat Texture: to match existing.
 - 2. Solid Plaster Base: Brick.
 - a. Plaster Type: Jobsite mixed plaster.

- b. Number of Coats: Three (first/scratch, leveling/brown and finish) minimum, or as required to match existing which is approximately 1 inch thick.
- c. Finish Coat Texture: to match existing.

2.02 JOBSITE MIXED CEMENT PLASTER

- A. Materials:
 - 1. Portland Cement: ASTM C150/C150M, Type II.
 - a. Finish Coat: White color.
 - 2. Lime: ASTM C206, Type S.
 - 3. Sand: Clean, well graded, and complying with ASTM C897.
 - 4. Water: Clean, fresh, potable, and free of mineral or organic matter that could adversely affect plaster.
 - 5. Plaster Mix Reinforcement: Glass fibers, chopped to 1/2 inch nominal length, and alkali resistant.
 - 6. Color Pigment: Synthetic type, color as selected.
- B. Plaster Mixes: Proportioned in accordance with ASTM C926; parts by volume.
 - 1. First Coat Over Lath:
 - a. Plaster Mix "CL": One part Portland cement, with minimum 3/4 part and maximum 1-1/2 parts hydrated lime.
 - b. Minimum 2-1/2 parts and maximum 4 parts sand, per total volume of cementitious materials.
 - 2. First Coat Over High Absorption Solid Base:
 - a. Plaster Mix "CL": One part Portland cement, with minimum 3/4 part and maximum 1-1/2 parts hydrated lime.
 - b. Minimum 2-1/2 parts and maximum 4 parts sand, per total volume of cementitious materials.
 - 3. Second Coat: Same mixture as first coat, without fiber reinforcement, except minimum 3 parts and maximum 5 parts sand.
 - 4. Finish Coat:
 - a. Plaster Mix "FL": One part Portland cement, with minimum 1-1/2 parts and maximum 2 parts hydrated lime.
 - b. Minimum 1-1/2 parts and maximum 3 parts sand, per total volume of cementitious materials.

2.03 ACCESSORIES

- A. Suspension Components: See Section 09 2116.
- B. Non-metallic Plaster Lath: special-faced gypsum or cement board. Section 09 2116.
- C. Finishing Accessories: ASTM C1063; extruded aluminum alloy (6063 T5), galvanized steel sheet ASTM A924/A924M G90, or rolled zinc, 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 and L-bead at exposed plaster edges.
- D. Bonding Compound: Provide type recommended for bonding plaster to solid surfaces, complying with ASTM C932.
- E. Reinforcing Mesh: 4.5 oz/sq yd alkali-resistant mesh.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions are acceptable prior to starting this work.
- B. Verify masonry joints are flush and surfaces are ready to receive work of this section, and that there are no existing bituminous or water repellent coatings on masonry surfaces.
- C. Verify lath is flat, secured to substrate, and joint and surface perimeter accessories are properly in place.

- D. Verify mechanical and electrical equipment and services located within areas to receive this work have been properly tested and approved.

3.02 PREPARATION

- A. Dampen masonry surfaces to reduce excessive suction.
- B. Roughen smooth concrete surfaces and apply bonding compound in accordance with manufacturer's written installation instructions.
- C. Apply dash bond coat of plaster to solid bases and moist cure for at least 24 hours before applying first coat of jobsite mixed plaster.

3.03 MIXING

- A. Mix only as much plaster as can be used prior to initial set.
- B. Mix materials dry, to uniform color and consistency, before adding water.
- C. Protect mixtures from frost or freezing temperatures, contamination, and excessive evaporation.

3.04 APPLICATION

- A. Apply plaster in accordance with manufacturer's written instructions and comply with ASTM C926.
- B. Base Coats:
 - 1. Apply base coat(s) to fully embed lath and to specified thickness.
 - 2. Follow guidelines in ASTM C926 and manufacturer's written installation instructions for moist curing base coats and application of subsequent coats.
- C. Leveling Coat:
 - 1. Apply leveling coat to specified thickness.
 - 2. Fully embed reinforcing mesh in leveling coat.
- D. Finish Coats:
 - 1. Cement Plaster:
 - a. Apply with sufficient material and pressure to ensure complete coverage of base.
 - b. Apply desired surface texture while mix is still workable.
 - c. Smooth trowel to a consistent finish.

3.05 TOLERANCES

- A. Maximum Variation from True Flatness: 1/4 inch in 10 feet.

END OF SECTION

SECTION 09 3000

TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tile for floor applications (T-#).
- B. Tile for wall (T-#) and base (TB-3) applications.
- C. Setting materials and grout.
- D. Non-ceramic trim.

1.02 RELATED REQUIREMENTS

- A. Section 07 9200 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.
- B. Section 09 0561 - Common Work Results for Flooring Preparation: Concrete slab topical moisture-vapor-reducing treatments.
- C. Section 09 2116 - Gypsum Board Assemblies: Tile backer board.

1.03 REFERENCE STANDARDS

- A. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar.
- B. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar.
- C. ANSI A108.1c - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement.
- D. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive.
- E. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
- F. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy.
- G. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout.
- H. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout.
- I. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework.
- J. ANSI A108.12 - American National Standard for Installation of Ceramic Tile with EGP (Exterior glue plywood) Latex-Portland Cement Mortar.
- K. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone.
- L. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar.
- M. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation.
- N. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-set Ceramic Tile and Dimension Stone Installation.
- O. ANSI A137.1 - American National Standard Specifications for Ceramic Tile.
- P. ANSI A326.3 - American National Standard Test Method for Measuring Dynamic Coefficient of Friction of Hard Surface Flooring Materials; 2017.

- Q. ASTM C373 - Standard Test Method for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products, Ceramic Tiles, and Glass Tiles.
- R. ASTM C373 - Standard Test Method for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products, Ceramic Tiles, and Glass Tiles; 2014a.
- S. ASTM C648 - Standard Test Method for Breaking Strength of Ceramic Tile; 2014.
- T. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009
- U. ASTM E492 - Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine.
- V. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation.

1.04 DEFINITIONS

- A. Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

1.05 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals for submittal procedures.
- B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
 - 1. Provide schedule of proposed membrane underlayments, bonding and grouting materials, and other materials recommended by the manufacturer as being acceptable for use in the intended application and with the substrates with which it will come into contact.
- C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, and setting details.
 - 1. Submit for each room (floor and/or walls), after field-verification to reflect actual conditions.
- D. Samples: Provide two full size tiles of each color selected with respective colored grout sample.
- E. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.
- B. Installer Qualifications:
 - 1. Company specializing in performing tile installation, with minimum of five years of documented experience.
 - 2. Installer Certification:
 - a. Ceramic Tile Education Foundation (CTEF): Certified Tile Installer (CTI).

1.07 MOCK-UP

- A. See Section 01 4000 - Quality Requirements, for general requirements for mock-ups.
- B. Construct floor tile mock-up where directed by Architect, incorporating all components specified for the location.
 - 1. Minimum size of each type of mock-up shall be 10 by 10 feet.
 - 2. Approved mock-ups may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

- C. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs of edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.
- D. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.09 FIELD CONDITIONS

- A. Do not install solvent-based products in an unventilated environment.
- B. Maintain ambient and substrate temperature above 50 degrees F and below 100 degrees F during installation and curing of setting materials.

1.10 WARRANTY

- A. See Section 01 7700 - Closeout Procedures for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. For floor tile, provide Static Coefficient of Friction of not less than 0.60.

2.02 TILE

- A. Manufacturers: Provide Basis of Design manufacturer listed in the Interior Finish Schedule, or a pre-approved standard or custom product from another manufacturers with equivalent performance, material properties, features, general configuration, appearance, and warranty.
- B. Manufacturers:
 - 1. **BASIS OF DESIGN:** Dal-Tile Corporation: www.daltile.com/#sle.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- C. Ceramic Mosaic Tile (T-1 thru T-8): ANSI A137.1, standard grade.
 - 1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
 - 2. Style / Pattern / Color / Finish: as indicated in Finish Schedule in Drawings.
 - 3. Size/ Install: as indicated in Finish Schedule in Drawings.
- D. Porcelain Tile (T-9, TB-1): ANSI A137.1, standard grade.
 - 1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
 - 2. Style / Pattern / Color / Finish: as indicated in Finish Schedule in Drawings.
 - 3. Size/ Install: as indicated in Finish Schedule in Drawings.
 - 4. Trim Units: cove base shapes in sizes indicated.

2.03 TRIM AND ACCESSORIES

- A. Non-Ceramic Trim: Material, styles, and dimensions to suit applications described below for setting using tile mortar.
 - 1. Applications:
 - a. Open edges of floor tile.
 - b. Wall corners, outside and inside.
 - c. Transition between floor finishes of different heights.
 - 2. Manufacturers:
 - a. **BASIS OF DESIGN:** Schluter-Systems: www.schluter.com/#sle.
 - b. Genesis APS International: www.genesis-aps.com/#sle.
 - c. Genotek: www.genotek.com..
 - d. Profilitec; www.profilitecsolutions.com.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
 - 3. Products:
 - a. For use at transitions between floor tile and other floor finishes:
 - 1) Basis of Design: Schluter-SCHIENE: www.schluter.com.
 - 2) Description: L-shaped brushed stainless steel profile with sloped top, anchor leg, and integrated grout joint spacer to accommodate tile thickness specified.
 - b. For use at expansion joints of floor tile:

- 1) Basis of Design: Schluter-DILEX-BT: www.schluter.com.
 - 2) Description: Roll-formed brushed stainless steel profile with integral 1-3/16" wide telescopic center section, with anchor legs to accommodate tile thickness specified
- c. Provide all accessory transition and termination pieces for a complete installation.

2.04 SETTING MATERIALS

- A. Provide setting and grout materials from same manufacturer.
- B. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.
1. Products:
 - a. ARDEX Engineered Cements; ARDEX X 5: www.ardexamericas.com/#sle.
 - b. Custom Building Products, with Multi-Surface Bonding Primer: www.custombuildingproducts.com/#sle.
- C. Thin-Set Latex-Portland Cement Mortar Bond Coat for Floor Tile: ANSI A118.4.
1. Applications: Use this type of bond coat where indicated for floor tile.
 2. Acceptable Manufacturers and Products:
 - a. Bostik, Inc.; Ditra-Set Thin-Set: www.bostik-us.com.
 - b. Custom Building Products; Flexbond Crack Prevention Thin-Set Mortar: www.custombuildingproducts.com.
 - c. LATICRETE International, Inc; LATICRETE 254 Platinum: www.laticrete.com.
 - d. Mapei Corporation; Ultraflex 3 Mortar.
 - e. Merkrete, by Parex USA, Inc; Merkrete 720 Marble Pro: www.merkrete.com.
 - f. ProSpec, an Oldcastle brand; Permalastic System: www.prospec.com.
 - g. TEC, H.B. Fuller Construction Products, Inc.; Uncoupling Membrane Mortar: www.tecspecialty.com.
 - h. Substitutions: See Section 01 6000 - Product Requirements.

2.05 GROUTS

- A. Provide setting and grout materials from same manufacturer.
- B. Polymer Modified Grout: ANSI A118.7 polymer-modified cement grout.
1. Applications: At typical floors, walls, and base.
 2. Use sanded grout for joints 1/8 inch wide and larger.
 3. Use unsanded grout for joints less than 1/8 inch wide.
 4. Colors: As selected by Architect from manufacturer's full line; to match existing.
 5. Acceptable Manufacturers and Products:
 - a. ARDEX Engineered Cements; ARDEX FL: www.ardexamericas.com/#sle.
 - b. Bostik, Inc.; Dry Tile Grout with Bostik 425 Multi-Purpose Acrylic Latex Additive: www.bostik-us.com.
 - c. Custom Building Products; Prism Color Consistent Grout: www.custombuildingproducts.com/#sle.
 - d. LATICRETE International, Inc; LATICRETE PERMACOLOR Grout: www.laticrete.com/#sle.
 - e. Mapei Corporation; Ultracolor Plus: www.mapei.com.
 - f. ProSpec, an Oldcastle brand; ProColor Grout: www.prospec.com.
 - g. TEC, an H.B. Fuller Construction Products Brand; TEC AccuColor Plus Grout: www.tecspecialty.com/#sle.
 - h. Substitutions: See Section 01 6000 - Product Requirements.

2.06 MAINTENANCE MATERIALS

- A. Grout Release: Temporary, water-soluble pre-grout coating.
1. Products:
 - a. Custom Building Products; Aqua Mix Grout Release: www.custombuildingproducts.com/#sle.
 - b. Substitutions: See Section 01 6000 - Product Requirements.

2.07 ACCESSORY MATERIALS

- A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
 - 1. Crack Resistance: No failure at 1/8 inch gap, minimum.
 - 2. Fluid or Trowel Applied Type:
 - a. Material: Synthetic rubber or Acrylic.
 - b. Thickness: 20 mils, maximum.
 - c. Products:
 - 1) H.B. Fuller Construction Products, Inc; TEC HydraFlex Waterproofing Crack Isolation Membrane: www.tecspecialty.com/#sle.
 - 2) LATICRETE International, Inc; LATICRETE Blue 92 Anti-Fracture Membrane: www.laticrete.com/#sle.
 - 3) Merkrete, by Parex USA, Inc; Merkrete Fracture Guard: www.merkrete.com/#sle.
 - 4) Sika Corp; SikaTile 200 Fracture Guard Rapid: www.sika.com/#sle.
 - 5) Substitutions: See Section 01 6000 - Product Requirements.
 - 3. Peel-and-Stick Sheet Type:
 - a. Material: Rubberized membrane laminated to reinforcing fabric.
 - b. Thickness: 20 mils, maximum.
 - c. Products:
 - 1) Proflex Products, Inc; Maxxim Sim-40: www.proflex.us/#sle.
 - 2) Protecto Wrap; AFM Anti-Fracture Membrane: www.protectowrap.com/#sle.
 - 3) Sika Corp; SikaTile 225 PNS: www.sika.com/#sle.
 - 4) Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of Work and are ready to receive tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of Work, are dust-free, and are ready to receive tile.
- C. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.
- D. Verify that required floor-mounted utilities are in correct locations.
- E. Verify topical moisture-vapor-reducing treatments have been installed.
- F. Proceed only when unsatisfactory conditions have been corrected in a manner complying with the Contract Documents. Starting work within a particular area will be construed as acceptance.

3.02 PREPARATION

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Protect surrounding work from damage.
- C. Vacuum clean surfaces and damp clean.
- D. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

3.03 INSTALLATION - GENERAL

- A. Install tile and grout in accordance with applicable requirements of ANSI A108.1 through A108.13, manufacturer's instructions, and TCNA Handbook recommendations.

- B. Lay tile to pattern indicated on Drawings. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout. Joints shall be 1/8 inch wide.
- E. Install non-ceramic trim in accordance with manufacturer's instructions.
- F. Sound tile after setting. Replace hollow sounding units.
- G. Keep control and expansion joints free of mortar, grout, and adhesive.
- H. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- I. Grout tile joints unless otherwise indicated.
- J. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.
- K. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.04 INSTALLATION - FLOORS - THIN-SET METHOD

- A. Over interior concrete substrates, install tile in accordance with TCNA Handbook Method F113, latex-Portland cement mortar, with polymer-modified cement grout.
- B. Use uncoupling membrane under all tile. Install in accordance with TCNA Handbook Method F125-Full.

3.05 INSTALLATION - WALL AND BASE TILE

- A. Over coated glass mat backer board on studs, install in accordance with TCNA (HB) Method W245.
- B. At Typical Walls: Over glass-mat-faced tile backer board on metal studs, install in accordance with TCNA Handbook Method W245, thin-set with latex-Portland cement mortar for large format tile, with polymer-modified cement grout.

3.06 MOVEMENT JOINTS

- A. Movement Joints, General: Installation Quality Standard: In accordance with TCNA Movement Joint Design Essentials EJ171 and as specified below.
- B. Floor Joints:
 - 1. General Requirements:
 - a. Continue construction, contraction (control), and expansion joints in building structure through tile work.
 - b. Isolate tile work that abuts a restraining structure or assembly.
 - c. When metal trim or sealant/backer is used for joint, width shall not be less than width of joint in building structure.
 - d. Tile shall not be placed over building expansion joints.
 - 2. Schedule of Sealant Products and Locations:
 - a. Latex-Portland Cement Grouted Floors: Install floor joint sealant with backer rod at horizontal joints in mortar and grout setting conditions.
 - b. Epoxy Grouted Floors: Install chemical resistant floor joint sealant full depth without backer rod at horizontal joints in epoxy grout setting conditions.
 - 3. Interior Movement Joint Spacing: As indicated on Drawings and as specified below:
 - a. Tile Exposed to Direct Sunlight or Moisture: 8 ft to 12 ft (2.4 m to 3.6 m) on center each way.
 - b. Tile Not Exposed to Sunlight: 20 ft to 25 ft (6 m to 7.5 m) on center each way.
- C. Interior Floor Joint Installation Schedule: Seal interior floor movement joints, as defined by TCNA, according to following schedule:
 - 1. Construction Joints: Floor joint sealant and backer rod.
 - 2. Contraction (Control) Joints: Floor joint sealant and backer rod.
 - 3. Isolation Joints: Floor joint sealant and backer rod.

4. Tile Expansion Joints: Floor joint sealant and backer rod.
5. Perimeter Joints between Wall and Floors: Floor joint sealant with backer tape.

3.07 FIELD QUALITY CONTROL

- A. Independently test floor tile surfaces for verification of enhanced slip resistance (DCOF) according to the AcuTest Method per ANSI A137.1 and ANSI A326.3; surfaces shall be labeled "safe" by NSF1 (National Floor Safety Institute) standards.
 1. Provide additional treatments of finishing as required to achieve desired results.

3.08 CLEANING AND PROTECTION

- A. Clean tile and grout surfaces.

3.09 PROTECTION

- A. Do not permit traffic over finished floor surfaces for 7 days after installation or as recommended by manufacturer. Protect tile through Date of Substantial Completion.

3.10 DEMONSTRATION

- A. Cleaning and Maintenance Training: Provide instruction to Owner's personnel for cleaning and maintenance of installed work, including methods and frequency for maintaining optimum condition under anticipated use; include precautions against cleaning materials and methods which may be detrimental to finishes and performance.

END OF SECTION

SECTION 09 5100
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling systems and associated accessories.
- B. Acoustical units.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 09 2116 - Gypsum Board Assemblies: Concealed suspended grid ceiling framing.
- C. Division 21 - Fire Suppression Requirements: Sprinkler heads in ceiling system.
- D. Division 23 - HVAC Requirements: Air diffusion devices in ceiling system.
- E. Division 26 - Electrical Requirements: Light fixtures in ceiling system.
- F. Division 27 - Communications Requirements: Speakers in ceiling system.
- G. Division 28 - Electronic Safety and Security Requirements: Devices in ceiling system.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- B. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
- C. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
- D. ASTM E1264 - Standard Classification for Acoustical Ceiling Products.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Sequence work to ensure suspended acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals for submittal procedures.
- B. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other ceiling finishes, mechanical and electrical items installed in the ceiling, and control and expansion joints.
- C. Product Data: Provide data on suspension system components and acoustical units.
- D. Samples: Submit two full size samples illustrating material and finish of acoustical units.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements for additional provisions.
 - 2. Extra Acoustical Units: Quantity equal to 2 percent of total installed.

1.06 QUALITY ASSURANCE

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.
- B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 FIELD CONDITIONS

- A. Do not install ceilings until space is enclosed and weatherproof; wet work in place is completed and normally dry; work above ceilings is complete; and ambient conditions of temperature and humidity are continuously maintained at values near those intended for final occupancy.
- B. Building areas to receive ceilings shall be free of construction dust and debris.
- C. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.09 WARRANTY

- A. 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 the following:
 - 1. Acoustical Panels: Sagging and warping.
 - 2. Grid System: Rusting and manufacturer's defects.
- B. Warranty Period:
 - 1. Acoustical Panels: Ten (10) years from Date of Substantial Completion.
 - 2. Suspension System: Ten (10) years from Date of Substantial Completion.
 - 3. Ceiling System: Thirty (30) years from Date of Substantial Completion

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acoustic Units:
 - 1. **BASIS OF DESIGN:** Armstrong World Industries, Inc: www.armstrong.com.
 - 2. CertainTeed Corporation: www.certainteed.com.
 - 3. Hunter Douglas Contract: www.hunterdouglascontract.com.
 - 4. Rockfon, LLC: www.rockfon.com.
 - 5. USG: www.usg.com.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Suspension Systems:
 - 1. Same as for acoustical units.
 - 2. Chicago Metallic Corporation: www.chicagometallic.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ACOUSTICAL UNITS

- A. Acoustical Units - General: ASTM E1264, Class A.
 - 1. VOC Content: As specified in Section 01 6116.
- B. Acoustical Panels , Typical: Painted mineral fiber, with the following characteristics:
 - 1. Classification: ASTM E1264 Type III.
 - a. Form: 2, water felted.
 - b. Pattern: "C" perforated small holes, "E" lightly textured.
 - 2. Size: 24 by 24 inches.
 - 3. Thickness: 5/8 inches.
 - 4. Light Reflectance: 83 percent, determined in accordance with ASTM E1264.
 - 5. NRC Range: 0.50, determined in accordance with ASTM E1264.
 - 6. Ceiling Attenuation Class (CAC): 35, determined in accordance with ASTM E1264.
 - 7. Panel Edge: Reveal.

8. Tile Edge: Beveled.
9. Color: White.
10. Suspension System Type 1: Exposed grid.
11. Products:
 - a. **BASIS OF DESIGN:** Armstrong World Industries, Inc; Dune:
www.armstrongceilings.com/#sle.
 - b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 SUSPENSION SYSTEMS

- A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.
 1. Materials:
 - a. Steel Grid: ASTM A653/A653M, G30 coating, unless otherwise indicated.
- B. Exposed Suspension System: Hot-dipped galvanized steel grid and cap.
 1. Structural Classification: Intermediate-duty, when tested in accordance with ASTM C635/C635M.
 2. Profile: Tee; 15/16 inch face width.
 3. Finish: Baked enamel.
 4. Color: White
 5. Products:
 - a. USG Corporation; Donn Brand DX/DXL: www.usg.com/ceilings/#sle.
 - b. Armstrong: Prelude.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.04 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Hanger Wire: 12 gauge, 0.08 inch galvanized steel wire.
- C. Hold-Down Clips: Manufacturer's standard clips to suit application.
- D. Perimeter Moldings: Same metal and finish as grid.
 1. Size: As required for installation conditions.
 2. Angle Molding: L-shaped, for mounting at same elevation as face of grid.
- E. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting Work.
- B. Verify that layout of hangers will not interfere with other Work.

3.02 PREPARATION

- A. Install after major above-ceiling work is complete.
- B. Coordinate the location of hangers with other work.

3.03 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Locate system on room axis according to reflected ceiling plan Drawings.
- D. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 1. Use longest practical lengths.

2. Overlap and rivet corners.
- E. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- I. Do not eccentrically load system or induce rotation of runners.

3.04 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- E. Cutting Acoustical Units:
 1. Make field cut edges of same profile as factory edges.
 2. Double cut and field paint exposed reveal edges.

3.05 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

SECTION 09 6813
TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet tile, fully adhered (CPT-#)
- B. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 09 0561 - Common Work Results for Flooring Preparation: Concrete slab topical moisture-vapor-reducing treatments.

1.03 REFERENCE STANDARDS

- A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials.
- B. CRI 104 - Standard for Installation of Commercial Carpet.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Shop Drawings: Indicate layout of carpet patterns in all locations. Indicate layout of joints and direction of carpet.
- D. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- E. Operation and Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Carpet Tiles: One full box of each color and pattern installed.
 - 3. Turn over to owner, for storage on-site or off-site.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum five years documented experience.
- B. Installer Qualifications: Company specializing in installing carpet tile.

1.06 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.
- B. Maintain minimum 70 degrees F ambient temperature 24 hours prior to, during and 24 hours after installation.
- C. Ventilate installation area during installation and for 72 hours after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide Basis of Design manufacturer listed in the Interior Finish Schedule, or a standard or custom product from another manufacturers with equivalent performance, material properties, features, general configuration, appearance, and warranty:
- B. Tile Carpeting:
 - 1. Interface, Inc: www.interface.com/#sle.
 - 2. J+J Flooring Group; www.jjflooringgroup.com

3. **BASIS OF DESIGN:** Mannington Commercial.
4. Milliken & Company: www.milliken.com/#sle.
5. Mohawk Group: www.mohawkgroup.com/#sle.
6. Patcraft; www.patcraft.com
7. Shaw Contract.
8. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

- A. Tile Carpeting (CPT-#): Multi-Level Pattern Cut/Loop, manufactured in one color dye lot.
 1. Tile Size: 24 by 24 inch, unless otherwise indicated in Interior Finish Schedule.
 2. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
 3. Properties:
 - a. Dye Method: 100% Solution Dyed
 - b. Primary Backing: as indicated in Finish Schedule
 - c. Radiant Panel: Class 1, when tested in accordance with ASTM E 648
 - d. Smoke Density: < 450, when tested in accordance with ASTM E 662
 4. Product:
 - a. Colors/Patterns: Refer to Interior Finish Schedule.
 - b. Install Method: Refer to Interior Finish Schedule.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by flooring material manufacturer.
- B. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.
 1. Adhesive "dots" prohibited.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet tile.
- C. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.
- D. Verify topical moisture-vapor-reducing treatments have been installed.
- E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler.
- C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- D. Vacuum clean substrate.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions and CRI 104 (Commercial).
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay out carpet and locate seams in accordance with shop drawings.

1. Locate seams in area of least traffic, out of areas of pivoting traffic, and parallel to main traffic.
 2. Do not locate seams perpendicular through door openings.
 3. Align run of pile in same direction as anticipated traffic and in same direction on adjacent pieces.
 4. Locate change of color or pattern between rooms under door centerline.
 5. Provide monolithic color, pattern, and texture match within any one area.
- F. Fully adhere carpet tile to substrate.
- G. Trim carpet tile neatly at walls and around interruptions.
- H. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 9000
PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints and other coatings (PNT-#, EPNT-#)
- C. Scope: Finish all interior and exterior surfaces exposed to view, including the following.
 - 1. Both sides and edges of plywood backboards for electrical and communication equipment before installing equipment.
 - 2. Exposed surfaces of steel columns, joists, lintels and ledge angles.
 - 3. Exposed concrete unit masonry (cmu).
 - 4. Mechanical and Electrical:
 - a. In finished areas, paint all insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
 - b. In finished areas, paint shop-primed items.
 - c. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
 - d. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items specified to be factory-finished; 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. Brick, architectural concrete, cast stone, integrally colored plaster and stucco.
 - 7. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 07 0553 - Fire and Smoke Assembly Identification
- C. Section 09 0190 - Maintenance of Finishes

1.03 DEFINITIONS

- A. Conform to 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.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.
- C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials.
- D. Green Seal Environmental Standards, GC-03, Anti-Corrosive Paints (1997).
- E. SSPC (PM1) - Good Painting Practice: SSPC Painting Manual, Vol. 1; Society for Protective Coatings.

1.05 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals for submittal procedures.

- B. Product Data: Provide complete list of all products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, the general product category (e.g. "acrylic latex"), and the intended application substrate.
 - 2. Cross-reference to specified paint system products to be used in; include description of each system.
 - 3. Manufacturer's application instructions.
- C. Samples: Submit two painted samples, illustrating selected colors and textures for each color and system selected with specified coats cascaded. Submit on tempered hardboard, 5 x 8 inch in size.
- D. Certification: By manufacturer that all paints and coatings comply with VOC limits specified.
- E. Manufacturer's Instructions: Indicate special surface preparation procedures.
- F. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements for additional provisions.
 - 2. Extra Paint and Coatings: 1 gallon of each color; 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 5 years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of Work specified with minimum 5 years documented experience.

1.07 MOCK-UP

- A. See Section 01 4000 - Quality Requirements for general requirements for mock-up.
- B. Provide panel, 10 feet high by 8 feet wide, illustrating designated coating color, texture, and finish.
- C. Provide door and frame assembly illustrating paint coating color, texture, and finish.
- D. Locate where directed.
- E. Accepted mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.09 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. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during paint application.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide all paint and coating products from the same manufacturer to the greatest extent possible.
 - 1. Substitution of other products by the same manufacturer is preferred over substitution of products by a different manufacturer.
- B. Basis of Design Color Selections: As indicated in Interior Material/Color Schedule on Drawings.
 - 1. To match adjacent existing paint for seamless finish. Paint entire surface as required to accomplish seamless finish.
- C. Basis of Design Top Coat Products and Sheen (regardless of color selection):
 - 1. Sherwin-Williams; ProMar 200 Zero VOC Interior Acrylic Latex, Eg-Shel sheen; use everywhere except as noted below.
 - 2. Sherwin-Williams; ProMar 200 Zero VOC Interior Acrylic Latex, Flat sheen; use on gypsum soffits and ceilings.
 - 3. Sherwin-Williams; Pro Industrial Water Based Catalyzed Epoxy, Semi-Gloss sheen; use on non-tiled walls in Restrooms and Custodial Rooms.
 - 4. Sherwin-Williams; Pro Industrial DTM Acrylic Latex; Semi-Gloss sheen; use for interior metal doors, frames, and metal fabrications to be painted.
 - 5. Sherwin-Williams; Waterborne Acrylic Dryfall, Flat sheen; use on exposed interior overhead metal surfaces as specified below.
 - 6. Sherwin-Williams; Solo 100% Acrylic Interior/Exterior Latex, semi-gloss sheen; use for interior wood doors, frames, and interior and exterior finish carpentry wood components to be painted.
 - 7. Flame Control Coatings, LLC; Flame Control No. 20-20A, Class A Intumescent Fire Retardant Latex Paint, flat sheen; use on Mechanical and Electrical Room plywood mounting boards.
- D. Other Acceptable Manufacturers:
 - 1. Benjamin Moore & Co: www.benjaminmoore.com/#sle.
 - 2. Diamond Vogel Paint: www.diamondvogel.com.
 - 3. PPG Paints: www.ppgpaints.com.
 - 4. Pratt & Lambert Paints: www.prattandlambert.com/#sle.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- E. Primer/Sealers: Same manufacturer as top coats.
- F. Block Fillers: Same manufacturer as top coats.

2.02 PAINTS AND COATINGS - GENERAL

- A. Provide manufacturer's highest quality product for type of coating specified.
- B. Paints and Coatings: Ready-mixed, unless intended to be a field-catalyzed coating.
 - 1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 - 3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 - 4. Supply each coating material in quantity required to complete entire project's work from a single production run.
 - 5. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
- C. Primer/Sealers: Where the manufacturer offers options on primer/sealers for a particular substrate, use primer/sealer categorized as "best" by the manufacturer.

- D. Volatile Organic Compound (VOC) Content: For field applications that are inside the weatherproofing system:
 - 1. Provide coatings that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
 - 3. General emissions evaluation: Products to be applied on the interior must be tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method v1.1--2017, using the applicable exposure scenario.
- E. Chemical Content: The following compounds are prohibited:
 - 1. Aromatic Compounds: In excess of 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
 - 2. Acrolein, acrylonitrile, antimony, benzene, butyl benzyl phthalate, cadmium, di (2-ethylhexyl) phthalate, di-n-butyl phthalate, di-n-octyl phthalate, 1,2-dichlorobenzene, diethyl phthalate, dimethyl phthalate, ethylbenzene, formaldehyde, hexavalent chromium, isophorone, lead, mercury, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, toluene (methylbenzene), 1,1,1-trichloroethane, vinyl chloride.
- F. Flammability: Comply with applicable code for surface burning characteristics.
- G. Sheens: Provide the sheens specified; gloss shall be tested in accordance with ASTM D523.
- H. Extend colors to surface edges; colors may change at any edge as directed by Architect.
 - 1. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

2.03 OPAQUE PAINT SYSTEMS - INTERIOR

- A. Plywood, Mechanical and Electrical Room Mounting Boards:
 - 1. Preparation and primer as specified by paint manufacturer.
 - 2. Two coats of Intumescent Fire Retardant Latex Paint.
 - 3. Color: White.
- B. Concrete and Concrete Masonry Units:
 - 1. Preparation and block filler/primer as specified by paint manufacturer.
 - 2. Two top coats.
- C. Ferrous Metals; including metal doors and frames, guardrails/railings, and other primed and unprimed metal surfaces:
 - 1. Preparation as specified by paint manufacturer.
 - 2. First coat: DTM primer/finish, anti-corrosive type recommended by top coat manufacturer.
 - 3. Two top coats.
- D. Galvanized Metals:
 - 1. Preparation as specified by paint manufacturer.
 - 2. First coat: DTM primer/finish, anti-corrosive type recommended by top coat manufacturer.
 - 3. Two top coats.
- E. Gypsum Board and Plaster Surfaces of Walls, Bulkheads, Ceilings and Soffits:
 - 1. One coat of primer recommended by paint manufacturer.
 - 2. Flat finish (bulkheads, ceilings, and soffits) Two top coats.
 - 3. Eggshell finish (walls): Two top coats.
- F. Gypsum Board Surfaces of Walls, Epoxy Paint Finish: all untiled restroom walls and ceilings.
 - 1. One coat of primer recommended by paint manufacturer.
 - 2. Semi-Gloss Finish: Two top coats.

2.04 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- 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 Board: 12 percent.
 - 2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
 - 3. Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to coating application.
- B. Prepare surfaces using the methods recommended by the paint manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. 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. Gypsum Board and Plaster Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.
- G. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.
- H. Shop-Primed Steel Surfaces to be Finish Painted: 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.
- I. Metal Doors and Frames to be Painted: Prime metal door and frame top and bottom edge surfaces.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's instructions.
- C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- E. Apply each coat to uniform appearance.

- F. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- G. Sand wood and metal surfaces lightly between coats to achieve required finish.
- H. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Paint equipment exposed to view, in occupied areas, to match adjacent wall color.
- B. Remove louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- C. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.05 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 PROTECTION

- A. Protect finished coatings until completion of Project.
- B. Touch-up damaged coatings after Substantial Completion.

END OF SECTION

SECTION 09 9300
STAINING AND TRANSPARENT FINISHING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of stains and transparent finishes.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 09 0190 - Maintenance of Finishes: Removing existing finishes prior to refinishing.
- C. Section 09 9000 - Painting and Coating: Opaque finishes for substrates.

1.03 DEFINITIONS

- A. Comply with 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.
- B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials.

1.05 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category.
- C. Samples: Submit two samples, illustrating selected colors and sheens for each system with specified coats cascaded. Submit on actual wood substrate to be finished, 12 by 12 inch in size.
 - 1. Match approved stain color under section 06 2000.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of stain or transparent finish, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Stain and Transparent Finish Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by manufacturer of stains and transparent finishes.
- 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 Temperature: 50 degrees F 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 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 Architect is obtained using the specified procedures for substitutions.
- B. Transparent Finishes:
1. Benjamin Moore
 2. Diamond Vogel
 3. PPG Paints; www.ppgpaints.com
 4. Sherwin-Williams Company; www.sherwin-williams.com/#sle.
- C. Stains:
1. Any of those listed above.
 2. Minwax.
- D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 STAINS AND TRANSPARENT FINISHES - GENERAL

- A. Finishes:
1. Provide finishes 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 finish material in quantity required to complete entire project's work from a single production run.
 4. Do not reduce, thin, or dilute 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 Architect from the manufacturer's full line.
- C. Colors: as required to match existing.

2.03 INTERIOR STAIN AND TRANSPARENT FINISH SYSTEMS

- A. Sponge wood with clean water and a cellulose sponge. When dry, sand with 22A sandpaper. Remove sanding dust with a clean rag dampened with tuluol.
- B. Open-Grain Wood Filler (M.P.I. #91): Factory-formulated paste wood filler applied at spreading rate recommended by manufacturer.
1. Benjamin Moore; Benwood Paste Wood Filler No. 238.
 2. Diamond Vogel: Old Masters Woodgrain Filler.
 3. PPG Paints; as recommended by finish manufacturer.
 4. Sherwin-Williams; Sher-Wood Fast-Dry Filler.
- C. Interior Wood Stain (M.P.I. #90): Factory-formulated alkyd-based penetrating wood stain for interior application applied at spreading rate recommended by manufacturer.
1. Benjamin Moore; Benwood Penetrating Stain No. 234.
 2. Diamond Vogel: Old Masters Penetrating Stain.
 3. PPG Paints; Deft Interior Semi-Transparent Oil Stain.
 4. Sherwin-Williams; Wood Classics Interior Oil Stain A-48 Series.
- D. Clear Sanding Sealer (under waterborne polyurethane): Factory-formulated fast-drying clear wood sealer applied at spreading rate recommended by manufacturer but not less than 1.0 mils.
1. Benjamin Moore; thinned Stays Clear Acrylic Polyurethane No. 423, Satin.
 2. Diamond Vogel: Old Masters H2O Acrylic Sanding Sealer..

3. PPG Paints; Deft WB Sanding Sealer.
 4. Sherwin-Williams; thinned Wood Classics Waterborne Polyurethane Satin, A68 Series.
- E. Interior Waterborne Clear Satin Polyurethane Varnish (M.P.I. #128): Factory-formulated clear satin acrylic-based polyurethane varnish. Applied to result in a dry film thickness of not less than 1.0 mils per coat.
1. Benjamin Moore; Stays Clear Acrylic Polyurethane No. 423, Satin.
 2. Diamond Vogel; Old Masters H2O Polyurethane.
 3. PPG Paints; Deft Satin Acrylic Clear Polyurethane.
 4. Sherwin-Williams; Wood Classics Waterborne Polyurethane Satin, A68 Series.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- 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. Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Wood Surfaces to Receive Opaque Finish: 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.
 1. Paint Finish: see Section 09 9000 - Painting and Coating.
- F. Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's written instructions.
- B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- C. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- D. Sand wood surfaces lightly between coats to achieve required finish.
- E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- F. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- G. Reinstall items removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 10 1400
SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Code-required signs, for restrooms and occupancy.

1.02 RELATED REQUIREMENTS

- A. Section 22 0553 - Identification for Plumbing Piping and Equipment.
- B. Section 26 0553 - Identification for Electrical Systems.
- C. Section 26 5100 - Interior Lighting: Exit signs required by code.

1.03 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities.

1.04 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
 - 1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
 - 2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
 - 3. Submit for approval by Owner through Architect prior to fabrication.
- D. Samples: Submit two samples of each major sign material, of size similar to that required for project, illustrating sign style, font, and method of attachment.
- E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- F. Verification Samples: Submit samples showing colors specified.
- G. Manufacturer's Qualification Statement.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor or building.
- C. Store tape adhesive at normal room temperature.

1.07 FIELD CONDITIONS

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Signs:
 1. A.R.K. Ramos Architectural Signage Systems
 2. ASI Signs
 3. Evolving Edge
 4. Inpro: www.inprocorp.com/#sle.
 5. Metal Arts; Division of L&H Manufacturing Company
 6. Nelson-Harkins Industries
 7. PrideNeon Sign Company; www.prideneon.com
 8. Serigraphics
 9. Southwell Company, The.
 10. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SIGNAGE APPLICATIONS

- A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
- B. Room and Door Signs: Provide signs as scheduled.
 1. Sign Type: Flat signs with injection molded panel media as specified.
 2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
 3. Sign Height: 6 inches, unless otherwise indicated.
 4. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings, and braille.
 5. Rest Rooms: Identify with standard international symbols/pictograms, the names "GENDER NEUTRAL", room numbers to be determined later, and braille.
- C. Occupancy Limit Signs:
 1. Sign Type: Flat signs with injection molded panel media as specified.
 2. Sign Height: 4 inches, minimum.
 3. Identify occupancy load limit. Architect to provide text.

2.03 SIGN TYPES

- A. Flat Signs: Signage media without frame.
 1. Edges: Square.
 2. Corners: Square.
 3. Wall Mounting of One-Sided Signs: Tape adhesive.
- B. Characters: Unless otherwise indicated:
 1. Character Font: Helvetica, Arial, or other sans serif font.
 - a. Characters shall not be italic, oblique, script, highly decorative, or of other unusual forms.
 2. Character Case: Upper case only.
 3. Character Height: 5/8 inch minimum; based on uppercase letter "I"

Height AFF to Baseline of Character	Horizontal Viewing Distance	Minimum Character Height
40 - 70 inches	less than 6 feet 6 feet or more	5/8 inch 5/8-inch, plus 1/8 inch per foot of viewing distance beyond 6 feet
>70 - 120 inches	less than 15 feet 15 feet or more	2-inches 2-inches, plus 1/8 inch per foot of viewing distance beyond 15 feet
More than 120 inches	less than 21 feet	3 inches

21 feet or more

3-inches, plus 1/8 inch per
foot of viewing distance
beyond 6 feet

4. Character Proportions: The width of the upper case "O" shall be 55% - 110% of the character height of the upper case "I". The stroke thickness of the upper case "I" shall be 15% maximum of the character height.
 5. Character (Letter) Spacing: 1/8 inch minimum and 4 times the tactile character stroke width maximum, measured from the top surface of the tactile text, between the two closest points of adjacent characters (excluding word spaces).
 6. Line Spacing: 135% minimum and 170% maximum of the character height.
 7. Raised borders and decorative elements: 3/8 inch minimum from tactile characters.
- C. Braille:
1. Braille case: lowercase; The indication of uppercase letter(s) shall only be used for proper nouns and names, individual letters of the alphabet, initials, acronyms, or before the first word of sentences.
 2. Shape: domed or rounded shape.
 3. Location: below corresponding text; if text is multi-lined, Braille shall be placed below the entire text.
 4. Spacing: separated by 3/8 inch minimum from tactile characters, raised borders, or decorative elements.
- D. Pictograms:
1. Pictograms or symbols must be located on a field of at least 6 inches in height.
 2. Provide descriptive text located directly below the pictogram field. Braille and tactile text may not intrude into the 6 inch field.
- E. Colors
1. Background Color: As selected by Owner or Architect.
 2. Character Color: Contrasting color.
 - a. Light characters against dark backgrounds or dark characters against light backgrounds are both acceptable.

2.04 ACCESSORIES

- A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.
- B. Tape Adhesive: Double sided tape, permanent adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install neatly, with horizontal edges level.
- C. Locate interior room and door signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
 1. Height: All tactile characters shall be 48 inches minimum and 60 inches maximum above the adjacent floor, measured from the baseline of the characters.
 2. Location: All room signs should be mounted adjacent to the latch side of the door, except the following:
 - a. Signs can be mounted on push doors that open in and have automatic door closures without hold-open devices.
 - b. If no wall space exists on the latch side of the door, mount sign on the nearest adjacent wall.

3. Distance from door: Signs shall have a minimum 18 x 18 inches space on the floor, centered on the sign, beyond the arc of any door swing between the closed position and 45° open position.

- D. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

3.03 SCHEDULE

ROOM	COPY
A. RESTROOM 02F	GENDER NEUTRAL RESTROOM
B. RESTROOM 02G	GENDER NEUTRAL RESTROOM
C. COURTROOM 02C	MAXIMUM OCCUPANCY 49 PERSONS
D. COURTROOM 02D	MAXIMUM OCCUPANCY 49 PERSONS

END OF SECTION

**SECTION 10 2113
TOILET COMPARTMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Stone panel toilet compartments, including matching:
 - 1. Urinal screens.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Blocking and supports.
- B. Section 08 1433 - Stile and Rail Wood Doors: doors for compartments

1.03 REFERENCE STANDARDS

- A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

1.05 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals, for submittal procedures.
- B. Product Data: Provide data on panel construction, hardware, and accessories.
- C. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall and floor supports, door swings.
- D. Samples: Submit two samples of partition panels, 6 by 6 inch in size illustrating panel finish, color, and sheen.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

PART 2 PRODUCTS

2.01 TOILET COMPARTMENTS

- A. Stone Panel Toilet Compartments:
 - 1. Stone (SSM-3): Marble, as indicated in Finish Schedule.
 - 2. Doors: Stile and rail doors. See Section 08 1433.
 - a. Thickness: 1-3/8 inches
 - b. Width: 24 inch, unless otherwise indicated.
 - c. Width for Handicapped Use: 36 inch, out-swinging.
 - d. Height: As indicated on drawings.
 - 3. Panels:
 - a. Thickness: 1 inch, to match existing.
 - b. Height: As indicated on drawings.
 - c. Depth: As indicated on drawings.
 - 4. Pilasters:
 - a. Thickness: 1 inch, to match existing.
 - b. Width: As required to fit space; minimum 3 inch.
 - 5. Screens: Without doors; to match compartments; mounted to wall with continuous panel brackets with vertical support/bracing same as compartments.

2.02 ACCESSORIES

- A. Pilaster Shoes: Stainless steel, satin finish, 3 inches high; concealing floor fastenings.
 - 1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.
- B. Wall and Pilaster Brackets: Stainless steel; continuous type.

- C. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
 - 1. For attaching panels and pilasters to brackets: Through-bolts and nuts; tamper proof.
- D. Hinges: Stainless steel; satin finish.
 - 1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
- E. Door Hardware: Stainless steel; satin finish.
 - 1. Door Latch: Flip or Slide type with exterior emergency access feature.
 - 2. Door Strike and Keeper with Rubber Bumper: Mount on pilaster in alignment with door latch.
 - 3. Provide door pull for outswinging doors.
- F. Coat Hook: as specified in 10 2800 - Toilet Accessories.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated on shop drawings.
- B. Verify correct spacing of and between plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 inch to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets.

3.03 TOLERANCES

- A. Maximum Variation From True Position: 1/4 inch.
- B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.
- C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

**SECTION 10 2800
TOILET ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Commercial toilet accessories, including but not limited to:
 - 1. Toilet Paper Dispenser
 - 2. Waste Receptacle (floor standing)
 - 3. Soap Dispenser
 - 4. Framed Mirrors
 - 5. Grab Bars
 - 6. Sanitary Napkin Disposals
- B. Miscellaneous Accessories, including but not limited to:
 - 1. Coat Hooks
- C. Diaper changing stations.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Concealed supports for accessories, including blocking.
- B. Section 09 2116 - Gypsum Board Assemblies; substrate
- C. Section 09 3000 - Tiling; substrate finish, coordination with joints and for recessed items.
- D. Section 22 4000 - Plumbing Fixtures: Under-lavatory pipe and supply covers.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- C. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- E. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
- F. ASTM C1036 - Standard Specification for Flat Glass.
- G. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
- H. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.05 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals for submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

1.06 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.07 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Commercial Toilet, Shower, and Bath Accessories:
 - 1. AJW Architectural Products: www.ajw.com.
 - 2. ASI - American Specialties, Inc: www.americanspecialties.com.
 - 3. Bradley Corporation: www.bradleycorp.com.
 - 4. **BASIS OF DESIGN:** Bobrick Washroom Equipment, Inc.; www.bobrick.com
 - 5. Georgia-Pacific Professional: www.blue-connect.com.
 - 6. Substitutions: Section 01 6000 - Product Requirements.
- B. Provide products of each category type by single manufacturer.
- C. See schedule, plans and elevations for quantities and locations.

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 four 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. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.
- F. Adhesive: Two component epoxy type, waterproof.
- G. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.
- H. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.03 FINISHES

- A. Stainless Steel: Satin finish, unless otherwise noted.
- B. Chrome/Nickel Plating: ASTM B456, SC 2, polished 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. Back paint components where contact is made with building finishes to prevent electrolysis.

2.04 COMMERCIAL TOILET ACCESSORIES

- A. Toilet Paper Dispenser: Roll-in-reserve type, designed to allow automatic activation of reserve roll when needed, or manual activation by pressing release bar, surface-mounted, stainless steel unit with pivot hinge, tumbler lock.
 - 1. Products:

- a. Bobrick: Contura B-4288.
- B. Paper Towel Dispenser: Electric, roll paper type.
 - 1. Cover: Stainless steel.
 - 2. Paper Discharge: Touchless automatic.
 - 3. Capacity: 8 inch diameter roll.
 - 4. Mounting: Semi recessed.
 - 5. Power: Battery operated.
 - 6. Refill Indicator: Illuminated refill indicator.
 - 7. Products:
 - a. Bobrick: B-29744.
- C. Waste Receptacle: Stainless steel, freestanding style with domed plastic top.
 - 1. Liner: Removable rigid molded plastic receptacle.
 - 2. Minimum capacity: 18 gallons.
 - 3. Products:
 - a. Bobrick: B-2300.
- D. Soap Dispenser: Liquid soap dispenser, wall-mounted, surface, with stainless steel cover and horizontal stainless steel tank and working parts; push type soap valve, check valve, and window gauge refill indicator, tumbler lock.
 - 1. Minimum Capacity: 40 ounces.
 - 2. Products:
 - a. Bobrick: Contura B-4112.
- E. Mirrors: Stainless steel framed, 1/4 inch thick tempered safety glass; 1.
 - 1. Size: 24 by 48 inches, unless indicated otherwise.
 - 2. Frame: 0.05 inch channel shapes, with mitered and welded and ground corners, and tamperproof hanging system; Matte Black finish.
 - 3. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
 - 4. Products:
 - a. Bobrick B-290 XXXX.MBLK.
- F. Grab Bars: Stainless steel, smooth surface.
 - 1. Standard Duty Grab Bars:
 - a. Push/Pull Point Load: 250 pound-force, minimum.
 - b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
 - c. Finish: Satin.
 - d. Nonslip grasping surface finish and snap flange concealed fasteners.
 - e. Length and Configuration: 36 inches, 18 inches, and 42 inches.
 - f. Products:
 - 1) Bobrick B-5806 Series.
 - g. Provide Bobrick 258 Series Anchors where grab bars are to be installed on toilet partitions.
 - 1) Type 304, 16 gauge, satin-finish stainless steel backplate. Threaded chrome-plated brass connectors shall be keyed to backplate to prevent rotation. Stainless steel machine screws shall be furnished by manufacturer.
- G. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, full-length stainless steel piano-type hinge on top lid, removable receptacle.
 - 1. Products:
 - a. Bobrick: Contura B-270.

2.05 UNDER-LAVATORY PIPE AND SUPPLY COVERS

- A. Specified in 22 4000 - Plumbing Fixtures.

2.06 DIAPER CHANGING STATIONS

- A. Diaper Changing Station: Wall-mounted folding diaper changing station for use in commercial toilet facilities, meeting or exceeding ASTM F2285.
 - 1. Style: Horizontal.
 - 2. Material: Polyethylene and stainless steel.
 - 3. Mounting: Surface.
 - 4. Features: Pneumatic cylinder, concealed hinge, ADA cam-buckle on safety strap, bag hook, liner dispenser, paper towel dispenser, 5-year warranty.
 - 5. Color: As selected.
 - 6. Minimum Rated Load: 200 pounds.
 - 7. Products:
 - a. KoalaKare: KB300-XXSS
 - b. Substitutions: 01 6000 - Product Requirements.

2.07 MISCELLANEOUS ACCESSORIES

- A. Coat Hook: Heavy duty stainless steel; double-prong rubber tipped hook, with square bracket and backplate for exposed attachment, satin finish.
 - 1. Location: one per toilet compartment stall.
 - 2. Product:
 - a. Bobrick B-212
 - b. Substitutions: Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.
- D. Verify that field measurements are as indicated on drawings.
- E. Verify installation of blocking, reinforcing plates, and concealed anchors in walls, and ceilings.
- F. See Section 06 10 00 - Rough Carpentry for installation of blocking 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.
 - a. Mount top of grab bar 34 inches above finish floor.
 - b. Where toilet paper dispenser mounting conflicts with a grab bar, mount above grab bar with bottom of dispenser 12 inches clear above grab bar, but no higher than 48 inches above finish floor.
 - 2. Mirrors: 40 inch, measured 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

SECTION 10 4400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

1.03 REFERENCE STANDARDS

- A. ADAAG - Americans with Disabilities Act Accessibility Guidelines, 2010
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems.
- C. FM (AG) - FM Approval Guide.
- D. NFPA 10 - Standard for Portable Fire Extinguishers.
- E. UL (DIR) - Online Certifications Directory.

1.04 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals for submittal procedures.
- B. Product Data: Provide extinguisher operational features, extinguisher ratings and classifications, color and finish, and anchorage details.
- C. Shop Drawings: Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets, and locations.
- D. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.05 COORDINATION

- A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire protection cabinets with wall depths.

PART 2 PRODUCTS - NOT USED

2.01 MANUFACTURERS

- A. Fire Extinguishers:
 - 1. Ansul, a Tyco Business: www.ansul.com.
 - 2. JL Industries, Inc; Cosmic 10E: www.jlindustries.com.
 - 3. Kidde, a unit of United Technologies Corp: www.kidde.com.
 - 4. **BASIS OF DESIGN:** Larsen's Manufacturing: MP Series; MP5-A
 - 5. Nystrom, Inc: www.nystrom.com.
 - 6. Pyro-Chem, a Tyco Business: www.pyrochem.com.
 - 7. Strike First Corporation of America: www.strikefirstusa.com.
 - 8. Substitutions: See Section 01 6000 - Product Requirements.
- B. Fire Extinguisher Cabinets and Accessories:
 - 1. Ansul, a Tyco Business: www.ansul.com.
 - 2. JL Industries, Inc: www.jlindustries.com.
 - 3. Kidde, a unit of United Technologies Corp: www.kidde.com.
 - 4. **BASIS OF DESIGN:** Larsen's Manufacturing Co: www.larsensmfg.com.
 - 5. Nystrom, Inc: www.nystrom.com.
 - 6. Potter-Roemer: www.potterroemer.com.
 - 7. Pyro-Chem, a Tyco Business: www.pyrochem.com.
 - 8. Strike First Corporation of America: www.strikefirstusa.com.

9. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
 - 1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
- B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gage.
 - 1. Cartridge Operated: Spun shell.
 - 2. Class: A:B:C type.
 - 3. Size: 10 pound.
 - 4. Finish: Baked polyester powder coat, red color.
 - 5. Temperature range: Minus 65 degrees F to 100 degrees F.
- C. Dry Chemical Type Fire Extinguishers: Stainless steel tank, with pressure gauge.
 - 1. Class: K type.
 - 2. 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 stainless steel sheet; 0.036 inch thick base metal.
- C. Cabinet Configuration: Semi-recessed type.
 - 1. Size to accommodate accessories.
 - 2. Exterior nominal dimensions of 13 inch wide by 27-1/2 inch high by 6 inch deep.
 - 3. Projected Trim: Rolled edge, returned to wall surface, with 3 inch projection, and 1-1/2 inch wide face.
- D. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with continuous piano hinge.
- E. Door Glazing: Vertical Duo, Acrylic plastic, clear, 1/8 inch thick, flat shape and set in resilient channel glazing gasket.
- F. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
- G. Fabrication: Weld, fill, and grind components smooth.
- H. Finish of Cabinet Exterior Trim and Door: No. 4 - Brushed stainless steel.
- I. Finish of Cabinet Interior: No.4 Brushed Stainless Steel.

2.04 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, chrome-plated.
- B. Lettering: "FIRE EXTINGUISHER" decal, or vinyl self-adhering, pre-spaced lettering in accordance with authorities having jurisdiction (AHJ). Color to be selected from manufacturer's standards.

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 in wall openings, 48 inches from finished floor to highest operable part.

- C. Secure rigidly in place.
- D. Place extinguishers in cabinets.

3.03 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

**SECTION 12 2400
WINDOW SHADES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior manual roller shades.
- B. Interior motorized roller shades.
- C. Motor controls.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.
- B. Section 26 2726 - Wiring Devices: Finish requirements for wall controls specified in this section.

1.03 REFERENCE STANDARDS

- A. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- B. NFPA 70 - National Electrical Code.
- C. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.
- D. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.
- E. WCMA A100.1 - Safety of Window Covering Products.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Where motorized shades are to be controlled by control systems provided under other sections, coordinate the work with other trades to provide compatible products.
 - 2. Coordinate the work with other trades to provide rough-in of electrical wiring as required for installation of hardwired motorized shades.
- B. Sequencing:
 - 1. Do not fabricate shades until field dimensions for each opening have been taken with field conditions in place.
 - 2. Do not install shades until final surface finishes and painting are complete.

1.05 SUBMITTALS

- A. See Section 01 3300 - Construction Submittals for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets, including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.
- C. Shop Drawings: Include shade schedule indicating size, location and keys to details, head, jamb and sill details, mounting dimension requirements for each product and condition, and operation direction.
- D. Verification Samples: Minimum size 6 inches square, representing actual materials, color and pattern.
- E. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty 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 ten years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of this type with minimum five years of documented experience with shading systems of similar size and type.

1. Manufacturer's authorized representative.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.
- B. Handle and store shades in accordance with manufacturer's recommendations.

1.08 FIELD CONDITIONS

- A. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.09 WARRANTY

- A. See Section 01 7700 - Closeout Submittals, for additional warranty requirements.
- B. Provide manufacturer's warranty from Date of Substantial Completion, covering the following:
 1. Shade Hardware: twenty-five years.
 2. Fabric: twenty-five years.
 3. Aluminum and Steel Coatings: five years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Interior Manually Operated Roller Shades:
 1. Draper, Inc; Clutch Operated FlexShade: www.draperinc.com/#sle.
 2. Hunter Douglas Architectural; RB500 Manual Roller Shades: www.hunterdouglasarchitectural.com/#sle.
 3. Lutron Electronics Co., Inc: www.lutron.com/#sle.
 4. MechoShade Systems LLC; Mecho/5 System: www.mechoshade.com/#sle.
 5. TimberBlindMetroShade; SolarVue Manual Roller Shade: www.timberblinds.com/commercial-division/#sle.
 6. **BASIS OF DESIGN:** SWFcontract, a division of Springs Window Fashions, LLC.: www.swfcontract.com/#sle.
 7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Interior Motorized Roller Shades, Motors and Motor Controls:
 1. Draper, Inc; Motorized FlexShade: www.draperinc.com/#sle.
 2. Lutron Electronics Co., Inc; Sivoia QS Roller Shades: www.lutron.com/#sle.
 3. Hunter Douglas Architectural; RB500 Motorized Roller Shades: www.hunterdouglasarchitectural.com/#sle.
 4. MechoShade Systems LLC; UrbanShade Single Roller - Motorized: www.mechoshade.com/#sle.
 5. **BASIS OF DESIGN:** SWFcontract, a division of Springs Window Fashions, LLC.: www.swfcontract.com/#sle.
 6. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ROLLER SHADES

- A. General:
 1. Provide shade system components that are easy to remove or adjust without removal of mounted shade brackets.
 2. Provide shade system that operates smoothly when shades are raised or lowered.
 3. Motorized Shades: Motor system housed inside roller tube, controlling shade movement via motor controls indicated; listed or recognized to UL 325.
 - a. Comply with NFPA 70.
 - b. Electrical Components: Listed, classified, and labeled as suitable for the purpose intended. Where applicable, system components to be FCC compliant.
 - c. Motors: Size and configuration as recommended by manufacturer for the type, size, and arrangement of shades to be operated; integrated into shade operating components and concealed from view; fully compatible with controls to be installed.
- B. Roller Shades, Manual:

1. Description - Interior Roller Shades: Single roller, manually operated fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and accessories.
 - a. Drop Position: Regular roll.
 - b. Roll Direction: Roll down, closed position is at window sill.
 - c. Mounting: Window jamb mounted- inside, between jambs.
 - d. Size: As indicated on drawings.
 - e. Fabric: As indicated under Shade Fabric article.
 2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
 - a. Material: Stamped steel.
 3. Roller Tubes: As required for type of shade operation.
 - a. Material: Extruded aluminum, baked enamel; color from manufacturer's standards.
 - b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
 - c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge.
 4. Hembars: Designed to maintain bottom of shade straight and flat.
 - a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.
 5. Manual Operation for Interior Shades:
 - a. Clutch Operator: Manufacturer's standard material and design, permanently lubricated.
 - b. Drive Chain: Continuous loop beaded ball chain, 95 lb minimum breaking strength. Provide upper and lower limit stops.
 - c. Chain Retainer:
 - 1) Chain tensioning device complying with WCMA A100.1.
 6. Accessories:
 - a. Fascia: Extruded aluminum, size as required to conceal shade mounting, attachable to brackets without exposed fasteners; baked enamel finish.
 - 1) Color: Antique Bronze.
 - 2) Profile: Square.
 - b. End Caps: Provide manufacturer's standard end caps to cover exposed ends of brackets.
 - c. Fasteners: Noncorrosive, and as recommended by shade manufacturer.
- C. Roller Shades, Motorized:
1. Description - Interior Roller Shades: Single roller, motor operated fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and accessories.
 - a. Drop Position: Regular roll.
 - b. Roll Direction: Roll down, closed position is at window sill.
 - c. Mounting: Window jamb mounted- inside, between jambs.
 - d. Size: As indicated on drawings.
 - e. Fabric: As indicated under Shade Fabric article.
 2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
 - a. Material: Stamped steel.
 3. Roller Tubes: As required for type of shade operation.
 - a. Material: Extruded aluminum, baked enamel; color from manufacturer's standards.
 - b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
 - c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge.
 4. Hembars: Designed to maintain bottom of shade straight and flat.
 - a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.

5. Accessories:
 - a. Fascia: Extruded aluminum, size as required to conceal shade mounting, attachable to brackets without exposed fasteners; baked enamel finish.
 - 1) Color: Antique Bronze.
 - 2) Profile: Square.
 - b. End Caps: Provide manufacturer's standard end caps to cover exposed ends of brackets.
 - c. Fasteners: Noncorrosive, and as recommended by shade manufacturer.

2.03 SHADE FABRIC

- A. Fabric: Non-flammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
 1. Manufacturers: see Interior Finish Schedule for Basis of Design.
 - a. MechoShade Systems LLC: www.mechoshade.com/#sle.
 - b. Mermet Corporation: www.mermetusa.com/#sle.
 - c. Phifer, Inc: www.phifer.com/#sle.
 - d. **BASIS OF DESIGN:** SWFcontract; A300 Crosshatch Color: Bone/Platinum F305.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
 2. Performance Requirements:
 - a. Flammability: Pass NFPA 701 large and small tests.
 - b. Fungal Resistance: No growth when tested according to ASTM G21.
 3. Light-Filtering Fabric
 - a. Openness Factor: 3%.
 - b. Color: as indicated in Finish Schedules.
 4. Fabrication:
 - a. Fabric Orientation: Railroaded, fabric is turned 90 degrees off the roll.
 - b. If height of opening requires multiple panels of railroaded fabric, use manufacturer's standard sewn seams.

2.04 MOTOR CONTROLS

- A. Unless specifically indicated to be excluded, provide all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the control intent indicated.
- B. Provide all components and connections necessary to interface with other systems as indicated.
- C. Manual Controls:
 1. Control Functions:
 - a. Open: Automatically open controlled shade(s) to fully open position when button is pressed.
 - b. Close: Automatically close controlled shade(s) to fully closed position when button is pressed.
 - c. Raise: Raise controlled shade(s) only while button is pressed.
 - d. Lower: Lower controlled shade(s) only while button is pressed.
 - e. Presets: For selection of predetermined shade positions.
 - f. Multiple Shade Groups: Provide individual controls for each shade group as indicated.
 2. Wall Controls: Provided by shade manufacturer.
 - a. Finish: As specified in Section 26 2726.
 - b. Basis of Design: Lutron Electronics, Inc; see Touch QS Wallstation: www.lutron.com/#sle.
 - 1) Programming: Support control of any individual shade or shade group/sub-group in system; customizable button actions.
 - 2) Power: Low-voltage; NFPA 70, Class 2.
 - 3) Wired Communications: Low-voltage; RS485.
 - 4) Style: Architectural Non-Insert Style.

- 5) Backlighting: Illuminate buttons and associated engraving; programmable light intensity.
- 6) Field-Changeable Replacement Kits: Support field-customization of button color, configuration, and engraving.
- 7) Contact Closure Interface: Two contact closure inputs with function independent of buttons.

2.05 ROLLER SHADE FABRICATION

- A. Field measure finished openings prior to ordering or fabrication.
- B. Dimensional Tolerances: Fabricate shades to fit openings within specified tolerances.
 1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch space between bottom bar and window sill.
 2. Horizontal Dimensions - Inside Mounting: Fill openings from jamb to jamb.
- C. At openings requiring continuous multiple shade units with separate rollers, locate roller joints at window mullion centers; butt rollers end-to-end.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine finished openings for deficiencies that may preclude satisfactory installation.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Start of installation shall be considered acceptance of substrates.

3.02 PREPARATION

- A. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.
- B. Coordinate with window installation and placement of concealed blocking to support shades.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.
- B. Replace shades that exceed specified dimensional tolerances at no extra cost to Owner.
- C. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

3.04 SYSTEM STARTUP

- A. Motorized Shade System: Provide services of a manufacturer's authorized representative to perform system startup.

3.05 CLEANING

- A. Clean soiled shades and exposed components as recommended by manufacturer.
- B. Replace shades that cannot be cleaned to "like new" condition.

3.06 CLOSEOUT ACTIVITIES

- A. See Section 01 7700 - Closeout Submittals, for closeout submittals.
- B. See Section 01 7900 - Demonstration and Training, for additional requirements.
- C. 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.

3.07 PROTECTION

- A. Protect installed products from subsequent construction operations.
- B. Touch-up, repair, or replace damaged products before Substantial Completion.

3.08 SCHEDULE

- A. ROOM 02C - LARGE COURTROOM, (7) shades, motorized.
- B. ROOM 02D - SMALL COURTROOM, (6) shades, motorized.
- C. ROOM 021C - OFFICE, (2) shades, 30" x 72", manual.
- D. ROOM 021D - OFFICE, (1) shade, 30" x 72", manual.
- E. ROOM 023C - OFFICE, (3) shades, 30" x 72", manual.
- F. ROOM 023D - OFFICE, (3) shades, 30" x 72", manual.

END OF SECTION

SECTION 22 0050
BASIC PLUMBING REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Basic Plumbing Requirements specifically applicable to Mechanical Division Specification Sections.
- B. Division 22 Specification requirements also include, by reference, all Division 00 and 01 specification sections. This contractor is responsible to review these specification sections. Requirements of these specification sections are included as a part of this contract.

1.02 OWNER OCCUPANCY

- A. The owner will occupy the premises during the construction period.
- B. Limit use of site and premises to allow owner occupancy.
- C. Cooperate with the owner to minimize conflict and to facilitate owner's operations.
- D. Schedule the work to accommodate this requirement.

1.03 REGULATORY REQUIREMENTS

- A. This contractor shall give proper authorities all requisite notices relating to work in their charge, obtain official permits, licenses for temporary construction and pay proper fees for it.
- B. This contractor is to be solely answerable for and shall promptly make good all damage, injury or delay to other contractors, to neighboring premises or to persons or property of the public by themselves, by their employees or through any operation under their charge, whether in the contract or extra work.
- C. No attempt has been made to reproduce in these specifications any of the rules or regulations contained in city, state or federal ordinances and codes pertaining to the work covered by these specifications that the contractor be thoroughly familiar with all such ordinances and codes.
- D. The fact that said various rules, regulations and ordinances are not repeated in this specification does not relieve the contractor of the responsibility of making the entire installation in accordance with the requirement of those authorities having jurisdiction.
- E. All work shall comply with the applicable recommendations of:
 - 1. The National Board of Fire Underwriters
 - 2. The American Gas Association
 - 3. The National Fire Protection Association (NFPA)
 - 4. The Occupations Safety and Health Act (OSHA)
 - 5. Current IBC Building Code
 - 6. Current applicable city building codes
- F. Mechanical: Conform to current mechanical code.
- G. Plumbing: Conform to current plumbing code.
- H. Obtain permits and request inspections from authority having jurisdiction.
- I. Safe Drinking Water Act and Senate Bill S.3874: All products must meet the lead-free requirements of the SDWA and NSF/ANSI 372 certification.

1.04 PROJECT/SITE CONDITIONS

- A. Install work in locations shown on the drawings unless prevented by project conditions.
- B. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to work specified in other sections. Obtain permission of owner and architect/engineer before proceeding.
- C. This contractor, before submitting their bid, shall visit the site of the project to familiarize themselves with locations and conditions affecting their work.

- D. It is the intent of this specification that the contractor furnishes all labor and material required completing the installation as outlined in the drawings and specifications. No additions to the contract price shall be allowed due to the failure of this contractor to properly evaluate the effect of existing conditions on the work to be done under this contract.
- E. Whenever renovation or remodeling or relocation of existing equipment is included in the contract, it is imperative that all locations of existing piping, ductwork, equipment, services and grades be noted on the job site before bid is submitted and that all elevations and grades be verified before roughing in new work.
- F. This contractor shall provide holes as necessary for the installation of their work and in accordance with other specification sections in materials other than the structure.

1.05 SEQUENCING AND SCHEDULING

- A. This contractor shall arrange their work in order that it progresses along with the general construction of the building.
- B. This contractor shall be kept informed as to the work of other trades engaged in the project and shall execute their work in such a manner so as not to delay or interfere with progress of other contractors.
- C. Where space for mechanical and electrical lines and piping is limited, it is imperative that all such trades coordinate their work so as to ensure concealment in space provided. Where conflict exists, the engineer shall decide priority of space. If work is not properly coordinated, the engineer may require removal and relocation of work without additional compensation.

1.06 GUARANTEE

- A. This contractor shall guarantee all of the apparatus, materials, equipment furnished and labor installed under this contract for a period of one year after date of final acceptance, unless a longer period is specified.
- B. Neither final certificate of payment nor any provisions in the contract documents nor partial or complete occupancy of premises by owner shall constitute an acceptance for work not done in accordance with contract documents or relieve the contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship.
- C. Should any defects arise as the result of defective workmanship or material within the guarantee period set forth, this contractor shall make the necessary correction at their own expense.

1.07 ENGINEER APPROVED EQUAL PRODUCTS

- A. When the engineer, at the request of the interested parties, including the contractor, supplier and manufacturer approved "engineer approved equal" products for this project, such products are approved on the assumption that they will equal or exceed the performance of the products specified.
- B. If such products do not do so after being installed on this project, this contractor shall replace or modify the particular product as necessary to equal the performance of the products specified at no expense to the owner, architect or engineer.
- C. Request for "engineer approved equal" products shall be received by the architect/engineer prior to the last addendum being issued. Requests for substitutions received after this date will not be considered. Substitution requests shall clearly state which products are being considered for substitution. Substitution requests shall include all pertinent product information needed to evaluate the substitution as an "equal".
- D. Similar products shall be all of the same manufacturers and style. There is no exception to this unless prior approval has been granted from engineer.

1.08 OWNER'S RIGHT OF SALVAGE

- A. Before beginning construction, this contractor shall check and verify with the owner each item of existing equipment that must be removed.

- B. The owner will designate which items of material or equipment not reused that they may wish to keep. This contractor shall then remove these items with care and store in a location designated by the owner for the owner's disposal.
- C. All other items of equipment to be removed and not specified for reuse in new construction or reserved by the owner for their use shall become the property of the contractor and shall be removed from site.

1.09 PROTECTION AND MAINTENANCE

- A. Where necessary to connect to any existing utility service, this contractor shall contact the owner and shall coordinate any building service connection with the owner so that normal operation to the building is disrupted as little as possible.
- B. Any work to be done in existing structures shall be coordinated with the owner and arrangements made so that traffic flow may be maintained and areas finished where possible before other areas are begun.
- C. This contractor shall protect existing equipment in finished areas from dirt, dust and damage as a result of their work.
- D. Coordinate protection requirements with department heads before beginning construction.
- E. Protect any building openings from unauthorized entry. Coordinate with owner where building entry must be controlled.

1.10 DEMOLITION

- A. This contractor shall be responsible for the demolition and removal of all existing mechanical elements within the project area except as follows:
 - 1. Elements shown on the drawings as "existing to remain and/or to be relocated".
 - 2. Elements serving adjacent areas.
 - 3. Elements required for the support of the newly remodeled areas.
 - 4. All elements to be removed are subject to the Owner's Right of Salvage.
- B. Preserve services to the existing facility. Extend/reroute/reconnect existing systems as required providing for the continued function of these systems.

1.11 CUTTING AND PATCHING

- A. This contractor shall do all cutting and patching necessary for the installation of their work in all existing and new buildings unless otherwise noted.
- B. This contractor shall arrange for openings in the building as required for the installation of equipment furnished under this contract.
- C. Where sewers must be extended or changed, patching with concrete will be done in the building. Patching shall be at both the top and bottom of sleeves where above grade.
- D. In areas where the integrity of new or existing fire separation assembly/wall is compromised by the work, contractor shall be responsible to patch and/or seal openings as necessary to maintain/return fire separation to rating as required by applicable codes.
- E. This contractor shall do all cutting and patching required for their work beyond the remodeled areas unless otherwise noted. All finish work shall include patching to match existing adjacent surfaces. Painting shall be by others.

1.12 CLEANING AND RUBBISH

- A. This contractor shall upon completion of his work, remove all rubbish and debris resulting from their operation and shall remove it from site at their own expense.
- B. In so far as their work is concerned, all equipment shall be cleaned and the premises left in first class condition.
- C. This contractor shall maintain the work area each day to prevent hazardous accumulation of waste from their work.

1.13 SEALING AND PENETRATION

- A. Clearance around the piping passing through fire or smoke rated construction shall be sealed to maintain the rated integrity of the construction (1 hr. 2 hrs. etc.). One and two-hour rated assemblies are to be patched on both sides of the assembly.
- B. This contractor shall verify rating and location of all such construction with the architectural drawings and seal all penetrations.
- C. Manufacturer offering products to comply with the requirements include the following:
 - 1. Dow Corning "Silicone RTV Foam"
 - 2. 3-M Corporation "Fire Barrier Caulk and Putty"
 - 3. Thomas & Betts "Flame Safe Fire Stop System"
- D. Installation of these products to be in strict accordance with manufacturer's recommendations and architectural specification sections or equivalent fire stopping architectural specification section.
- E. This contractor shall submit shop drawings showing approved sealing assemblies to be utilized on this project.

1.14 HAZARDOUS MATERIALS

- A. If the contractor stores any hazardous solvents or other materials on the site, they shall obtain copies of the safety data sheets for the materials and post them on the site. The contractor shall inform the owner and all employed of any potential exposure to this material.
- B. At no time shall any product containing asbestos be incorporated into the work.
 - 1. If asbestos materials are encountered, report to the owner. The owner will be responsible for asbestos removal.

1.15 RECORD DRAWINGS

- A. This contractor shall provide, at the conclusion of the project, one clean, non-torn, neat, and legible "as-built" set of drawings to the owner. These drawings shall show the routing of pipes, ductwork and equipment drawn in at scaled locations. All dimensions indicated shall be referenced to a column line. A set of construction blue prints will be furnished for this work.
- B. All mechanical systems installed shall be shown on the "as-built" drawings.
- C. Refer to respective architectural specification section for additional information.
- D. This contractor shall update these drawings during the project at least every week.

1.16 REVIEW OF MATERIALS

- A. This contractor shall submit to the engineer for review one (1) electronic copy of a brochure giving a complete list of materials and equipment they propose to furnish. The brochure shall contain complete information as to the make of equipment, type, size, capacities, dimensions and illustration. One of the returned copies shall be kept on the job at all times.
- B. Checking of submittal drawings by the engineer does not relieve the contractor of the responsibility for the accuracy of such drawings and for their conformity to drawings and specifications unless the contractor notifies engineer in writing of such deviation at time such drawings are furnished.
- C. All submittals shall have the date marked on them when the contractor receives them from the supplier. Submittals shall be submitted through the contractor and shall not come direct from the supplier to the architect or engineer.
- D. This contractor shall mark the date and sign each set that they have checked each of them in their entirety before submitting to the engineer. Submittals that are not dated and signed by the contractor will not be accepted, or checked and will be marked "resubmit" and sent back to the contractor.

1.17 TEST OF SYSTEMS

- A. This contractor shall, before concealed, test all systems installed under this contract as called for in these specifications and as required by local codes. Tests shall be made in the presence

of the engineer, local authorities or their duly authorized representative. Any defects discovered in testing shall be corrected and the tests repeated until all defects are eliminated.

- B. This contractor shall be held responsible for all damage resulting from defects in the system.
- C. At the conclusion of construction (before any covering up, painting or finishing) each element of the system shall be thoroughly tested against leakage with appropriate pressure tests as outlined herein and in appropriate sections of the specifications. All testing shall be hydrostatic unless permission is granted otherwise.
 - 1. Water: 100 psi maintained 8 hours
 - 2. Sanitary Sewer: 10 foot hydrostatic
- D. Fluid lines other than the above 1.5 times operating with a minimum pressure of 60 psig.
- E. No covering or backfilling of sewer lines shall be done until inspected by the architect or local inspector. Test T's shall be provided on all waste and vent stacks 4'-6" above each floor as required for testing the plumbing system.
- F. After completion of installation, the systems shall be given tests under full operating conditions and pressures and all adjustments shall be made to make the system operative as required. All safety devices shall be tested for correct operation.

1.18 SCOPE OF WORK

- A. All work shall be performed by well-qualified and licensed mechanics with a thorough knowledge of the various systems involved in this building. It shall be this contractor's responsibility to see that their mechanics are familiar with all the various codes and tests applicable to this work.
- B. All equipment shall be new and of the type as specified by the engineer unless otherwise noted in these specifications or on the drawings to remain and or be reused.
- C. The intent of the drawings and specifications is for complete installation of the systems outlined in the drawings and specifications so that at the conclusion of construction the system will be turned over to the owner complete and ready for safe and efficient operation.
- D. This contractor shall be required to furnish and install all such items normally included on systems of this type, which, while not mentioned directly herein or on the drawings are obviously essential to the installation and operation of the system and which are normally furnished on quality installation of this type. The drawings and specifications cannot deal individually with the many minute items that may be required by the nature of the systems.
- E. If there is a discrepancy between the drawings and the specifications or within either document, the more stringent requirement shall be estimated unless brought to the engineer's attention and an addendum is issued for clarification.
- F. The Plumbing Contractor shall establish system elevations prior to fabrication and installation. The Plumbing Contractor shall coordinate elevations with other trades. All elevations shall be coordinated with all trades in the field prior to installation. When a conflict between trades arises, the design team shall be notified immediately prior to further installation however priority shall be as follows:
 - 1. Lighting Fixtures
 - 2. Gravity flow piping, including steam and condensate.
 - 3. Electrical bus duct.
 - 4. Sheet metal.
 - 5. Cable trays, including access space.
 - 6. Other piping.
 - 7. Conduits and wireway.

1.19 VERIFICATION OF ELEVATION OF EXISTING LINES

- A. This contractor, before starting any new work, shall verify the elevations of all existing piping to which they must connect under this contract. The contractor shall report any discrepancies between drawing elevations and actual elevations to the engineer before proceeding with the

work. Failure of the contractor to do so shall make them liable for the cost of extra work involved.

1.20 DAILY HOUSEKEEPING

- A. At the end of each working day, this contractor shall remove all of their debris, rubbish, tools and surplus materials from the project work area. The work area shall be broom clean and left in a neat and orderly condition. The contractor for the removal of debris from the project shall not use the owner's waste disposal facility.
- B. At end of construction, all equipment shall be cleaned and the premises left in first class condition as far as this contractor's work is concerned.

1.21 CLEANING OF MECHANICAL SYSTEMS

- A. The mechanical contractor shall clean and passivate all plumbing systems. Flush systems with water until free from all sand, grit, gravel, oil, etc. Provide Babcock/Wilcox Millipore and biological testing on the flush water. The flush will be considered a success when the water exiting the system contains less than 100 ppb of total suspended solids and less than 100 RLUs.
- B. Where connections are made to existing piping systems, this contractor shall provide isolation valves, threaded tees, etc., as required to facilitate the cleaning and testing of all new piping.
- C. This contractor shall thoroughly clean all rust, grease, plaster, cement, etc., from all equipment and piping furnished and installed by them as required to leave surfaces suitable for finish painting.
- D. This contractor shall keep all pipes, traps, waste lines, ducts, etc., plugged, drained or otherwise protected during construction. All items of mechanical equipment shall be suitably protected and upon completion of project shall be equal to new condition.

1.22 ALTERNATES

- A. Refer to General Specification Sections for alternate bid description.

1.23 DIGITAL MEDIA AGREEMENT

- A. Computer Aided Drafting (CAD) documents may be available to the contractor for some uses. Contact the engineer prior to bidding to determine what information is available to be transmitted to the contractor in digital form.
- B. When documents are determined to be available, and as requested by the contractor, they will be transmitted upon the completion and execution of the MODUS digital media agreement. A service fee for each document transmitted will be assessed to the contractor. Documents will be transmitted upon payment receipt. Current service fee is \$100.00 per CAD sheet.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION 22 0050

SECTION 22 0529

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe hangers and supports
- B. Accessories

1.02 RELATED SECTIONS

- A. Specification Section 22 1116 - Domestic Water Piping

1.03 REFERENCES

- A. ASME B31.9 - Building Services Piping
- B. ASTM F708 - Design and Installation of Rigid Pipe Hangers
- C. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer
- D. MSS SP69 - Pipe Hangers and Supports - Selection and Application
- E. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices

1.04 SUBMITTALS

- A. Product Data: Provide manufacturers catalog data including load capacity.
- B. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.
- C. Manufacturer's Installation Instructions: Indicate special procedures and assembly of components.

1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable code for support of piping.

PART 2 PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

- A. Manufacturers:
 - 1. Anvil International
 - 2. Tolco/Cooper B-Line
 - 3. Engineer approved equal.
- B. Plumbing Piping - Drain, Waste and Vent:
 - 1. Conform to ASME B31.9; ASTM F708
 - 2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inch: Carbon steel adjustable swivel, split ring. Figure 104.
 - 3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis. Anvil International Figure 260.
 - 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 - 5. Wall Support for Pipe Sizes to 3 Inches: Cast iron bracket. Anvil International Figure 213.
 - 6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp. Anvil International Figure 195.
 - 7. Vertical Support: Steel riser clamp. Anvil International Figure 261.
 - 8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support. Anvil International Figure 264.
 - 9. Copper Pipe Support: Carbon steel ring, adjustable, and copper plated. Anvil International Figure 97.
- C. Plumbing Piping - Water:
 - 1. Conform to ASME B31.9; ASTM F708.
 - 2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Carbon steel adjustable swivel, split ring. Anvil International Figure 104.

3. Hangers for Cold Pipe Sizes 2 Inch and Over: Carbon steel, adjustable, clevis. Anvil International Figure 260.
4. Hangers for Hot Pipe Sizes 2 Inch to 4 Inch: Carbon steel, adjustable, clevis. Anvil International Figure 260.
5. Hangers for Hot Pipe Sizes 6 Inch and Over: Adjustable steel yoke, cast iron roll, single hanger. Anvil International Figure 181.
6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded spacers and hanger rods, cast iron roll. Anvil International Figure 175.
8. Wall Support for Pipe Sizes to 3 Inches: Cast iron bracket. Anvil International Figure 213.
9. Wall Support for Pipe Sizes 4 Inches Over: Welded steel bracket and wrought steel clamp. Anvil International Figure 195.
10. Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll. Anvil International Figure 195 and 181.
11. Vertical Support: Steel riser clamp. Anvil International Figure 261.
12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support. Anvil International Figure 264.
13. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support. Anvil International Figure 264.
14. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support. Anvil International Figure 274.
15. Copper Pipe Support: Carbon steel ring, adjustable, copper plated. Anvil International Figure 97.

2.02 ACCESSORIES

- A. Hanger Rods: Mild steel threaded both ends, threaded one end or continuous threaded.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.02 PIPE HANGERS AND SUPPORTS

- A. Support horizontal piping as scheduled.
- B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- C. Place hangers within 12 inch of each horizontal elbow.
- D. Use hangers with 1-1/2 inch minimum vertical adjustment.
- E. Support horizontal cast iron pipe adjacent to each hub with 5 foot maximum spacing between hangers.
- F. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.
- G. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- H. Support riser piping independently of connected horizontal piping.
- I. Provide copper plated hangers and supports for copper piping.
- J. Design hangers for pipe movement without disengagement of supported pipe.
- K. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.03 SCHEDULES

HANGER ROD	MAX. HANGER SPACING	DIAMETER
Pipe Size	Feet	Inches
1/2 to 1-1/4	6.5	3/8
1-1/2 to 2	10.0	3/8
2-1/2 to 3	10.0	1/2
4 to 6	10.0	5/8

END OF SECTION 22 0529

SECTION 22 0553
IDENTIFICATION FOR PLUMBING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tags
- B. Pipe markers

1.02 REFERENCES

- A. ASME A13.1 - Scheme for the Identification of Piping Systems

1.03 SUBMITTALS

- A. Submit list of wording, symbols, letter size, and color-coding for mechanical identification.
- B. Product Data: Provide manufacturers catalog literature for each product required.
- C. Manufacturer's Instructions: Indicate installation instructions, special procedures, and installation.
- D. Project Record Documents: Record actual locations of tagged valves, include valve tag numbers.

PART 2 PRODUCTS

2.01 TAGS

- A. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

2.02 PIPE MARKERS

- A. Color and Lettering: Conform to ASME A13.1.
- B. Plastic Underground Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6" W x 4" mil thick, manufactured for direct burial service.
- C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings indicating flow direction arrow and identification of fluid being conveyed.

PART 3 EXECUTION

3.01 PREPARATION

- A. De-grease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

- A. Install identifying devices after completion of coverings and painting.
- B. Install tags using corrosion resistant chain. Number tags consecutively by location.
- C. Install underground plastic pipe markers six inch (6") to eight inch (8") below finished grade, directly above buried pipe.
- D. Identify valves in main and branch piping with tags.
- E. Tag automatic controls, instruments, and relays. Key to control schematic.
- F. Identify piping, concealed or exposed with plastic tape pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 foot on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure and at each obstruction. Identify on both sides of any wall.

END OF SECTION 22 0553

SECTION 22 0719
DOMESTIC PLUMBING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fiberglass

1.02 RELATED SECTIONS

- A. Specification Section 22 0553 - Identification for Plumbing Piping and Equipment

1.03 REFERENCES

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus
- B. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement
- C. ASTM C240 - Standard Test Methods of Testing Cellular Glass Insulation Block
- D. ASTM C449/C449M - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement
- E. ASTM C518 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
- F. ASTM C547 - Standard Specification for Mineral Fiber Preformed Pipe Insulation
- G. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation
- H. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation
- I. ASTM D1056 - Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
- J. ASTM D1667 - Standard Specification for Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers
- K. ASTM D1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
- L. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics
- M. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
- N. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials
- O. NAIMA National Insulation Standards
- P. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials
- Q. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials

1.04 SUBMITTALS

- A. Product Data: Provide product description, thermal characteristics, list of materials, and thickness for each service and location.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to maximum flame spread/smoke developed rating of 25/50 in accordance with ASTM E84.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Accept materials on site, labeled with manufacturer's identification, product density and thickness.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 FIBERGLASS

- A. Manufacturers:
 - 1. Johns Manville Micro-Lok HP
 - 2. Owens Corning
 - 3. Knauff
 - 4. Engineer approved equal.
- B. Insulation: ASTM C547 rigid molded, noncombustible.
- C. "K" Value: ASTM C335, 0.23 at 75 deg F.
- D. Minimum Service Temperature: 0 deg F.
- E. Maximum Service Temperature: 800 deg F.
- F. Maximum Moisture Absorption: <5% by weight.
- G. Vapor Barrier Jacket: ASTM C1136, white Kraft paper with fiberglass yarn, bonded to aluminized film.
- H. Moisture Vapor Transmission: ASTM E96; 0.02 perm inches.
- I. Secure with self-sealing longitudinal laps and butt strips.
- J. Surface Burning: ASTM E84; Flame Spread-25, Smoke Developed-50
- K. VOC Content: ASTM D5116; 0.15 g/l

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry with foreign material removed.

3.02 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Exposed Piping: Locate insulation and cover seams in least visible locations.
- C. Insulated Dual Temperature Pipes or Cold Pipes Conveying Fluids Below Ambient Temperature:
 - 1. Provide vapor barrier jackets, factory applied or field applied.
 - 2. Insulate fittings, joints and valves with molded insulation of like material and thickness as adjacent pipe.
 - 3. Provide PVC fitting covers.
 - 4. Continue insulation through walls (unless in firewall sleeves), pipe hangers and other pipe penetrations.
 - 5. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
 - 6. Vapor seal insulation ends every 20 feet.
- D. Insulated Pipes Conveying Fluids Above Ambient Temperature:
 - 1. Provide standard jackets with vapor barrier, factory applied.
 - 2. Insulate fittings, joints and valves with insulation of like material and thickness as adjoining pipe.

3. Provide PVC fitting covers.
 4. Continue insulation through walls (unless in firewall sleeves) pipe hangers and other pipe penetrations.
- E. Inserts and Shields:
1. Manufacturers:
 - a. Jeff Company/Buckaroo
 - b. Amacell
 - c. Cooper/Eaton
 - d. TPS
 - e. Engineer approved equal.
 2. Shields: Galvanized saddle with flared edges between pipe hangers or pipe hanger rolls and inserts.
 3. Insert Location: Between support shield and piping and under the vapor barrier and finish jacket.
 4. Insert Configuration: Minimum six inch (6") long of same thickness and contour as adjoining insulation; may be factory fabricated.
 5. Insert Type:
 - a. Polystyrene and Fiberglass Insulation: 360 degree polyisocyanurate or phenolic foam cylindrical insert capable of supporting piping system. Pre-fabricated, insulated and jacketed supports are acceptable. Blocks, plugs, or wood material are not acceptable.
 - b. Flexible Elastomeric Foam Insulation: Pre-fabricated 360 degree insulated pipe hanger with polyethylene inserts (Armacell "Armafix" or equal). Match thickness of pipe insulation. Hanger shall have PVC or aluminum jacket. Provide friction tape on inside of pipe clamp/support to avoid slipping.
- F. Insulation shall be continuous at all hangers. Hanger shall not be in direct contact with pipe.
- G. Insulation on piping served by heat trace shall be sized large enough to enclose the pipe and the heat wire.

3.03 TOLERANCE

- A. Substituted insulation materials shall provide thermal resistance within 10% at normal conditions, as materials indicate.

3.04 SCHEDULE

FIBERGLASS INSULATION

PIPING SYSTEMS:	PIPE SIZE	THICKNESS
Plumbing Systems:		
Domestic Hot Water and Re-Circulation	Less than 1.5"	1"
Domestic Hot Water and Re-Circulation	1.5" and Larger	1.5"
Domestic Cold Water	All	1"
Condensate Drain from Cooling Coil:	All	1"

END OF SECTION 22 0719

SECTION 22 1116
DOMESTIC PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sanitary sewer piping (above grade)
- B. Water piping (above grade)
- C. Ball valves
- D. Pipe accessories

1.02 RELATED SECTIONS

- A. Specification Section 22 0553 - Identification for Plumbing Piping and Equipment

1.03 REFERENCES

- A. ASME B31.1 - Power Piping
- B. ASME B31.9 - Building Service Piping
- C. ASME Section 9 - Welding and Brazing Qualifications
- D. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250 and 800
- E. ASME B16.3 - Malleable Iron Threaded Fittings
- F. ASME B16.4 - Cast Iron Threaded Fittings Class 125 and 250
- G. ASME B16.18 - Cast Bronze Solder - Joint Pressure Fittings
- H. ASME B16.22 - Wrought Copper and Bronze Solder-Joint Pressure Fittings
- I. ASME B16.23 - Cast Copper Alloy Solder-Joint Drainage Fittings – DWV
- J. ASME B16.26 - Cast Bronze Fittings for Flared Copper Tubes
- K. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings - DWV
- L. ASME B16.32 - Cast Copper Alloy Solder-Joint Fittings for Solvent Drainage Systems
- M. ASTM A74 - Cast Iron Soil Pipe and Fittings
- N. ASTM B32 - Solder Metal
- O. ASTM B43 - Seamless Red Brass Pipe
- P. ASTM B88 - Seamless Copper Water Tube
- Q. ASTM B306 - Copper Drainage Tube (DWV)
- R. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings
- S. AWS A5.8 - Brazing Filler Metal
- T. AWWA C651 - Disinfecting Water Mains
- U. CISPI 301 - Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems
- V. CISPI 310 - Joints for Hubless Cast Iron Sanitary Systems
- W. NSF/ANSI 61 - Drinking Water System Components - Health Effects
- X. NSF/ANSI 372 - Drinking Water System Components - Lead Content

1.04 SUBMITTALS

- A. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- B. Provide schedule of all system types and piping and fitting types provided, clearly indicating which submitted piping and fittings are associated to each system on the project. Schedule shall be at the beginning of piping submittal

1.05 PROJECT RECORD DOCUMENTS

- A. Record actual locations of valves.

1.06 OPERATION AND MAINTENANCE DATA

- A. Maintenance Data: Include installation instructions, spare parts list and exploded assembly views.

1.07 QUALITY ASSURANCE

- A. Perform work in accordance with the State of Iowa.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Welding Materials and Procedures: Conform to ASME Code and applicable state labor regulations.
- D. Welder's Certification: In accordance with ASME Section IX.
- E. Identify pipe with marking including size, material classification, specification, potable water certification and water pressure rating.
- F. Maintain one copy of each document on site.
- G. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute or be prior approved by engineer.
- H. All cast iron soil pipe and fittings shall be installed according to the latest edition of the Cast Iron Soil Pipe and Fittings Handbook.

1.08 REGULATORY REQUIREMENTS

- A. Perform work in accordance with local jurisdiction plumbing code.
- B. Conform to applicable code for installation of back flow prevention devices.
- C. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of back flow prevention devices.
- D. Wetted surfaces of brass and bronze components shall contain <0.25% weighted average lead content (lead free) as defined by NSF/ANSI Standards 61 and 372.

1.09 DELIVERY, STORAGE AND PROTECTION

- A. Deliver, store, protect and handle products to site.
- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on cast iron and steel valves.
- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work and isolating parts of completed system.

PART 2 PRODUCTS

2.01 SANITARY SEWER PIPING (ABOVE GRADE)

- A. Cast Iron Pipe:
 - 1. CISPI 301 hubless service weight three inch (3") and larger.
 - 2. Fittings: Cast iron.
 - 3. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies conforming to CISPI 310.
 - 4. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute or be prior approved by engineer.
- B. Copper Tube:
 - 1. ASTM B306, type #M.
 - 2. Fittings: ASME B16.29 wrought copper.
 - 3. Joints: ASTM B32 solder Grade 50B.

2.02 WATER PIPING (ABOVE GRADE)

- A. Copper Tubing:
 - 1. ASTM B88, type #L hard drawn.
 - 2. Fittings: ASME B16.22, wrought copper and bronze.
 - 3. Joints: ASTM B32, solder, Grade 95TA.

2.03 BALL VALVES (UP TO AND INCLUDING 2 INCHES)

- A. Manufacturers:
 - 1. Apollo #77CLF-140/240
 - 2. Watts #LFB 6080/6081 G2-SS
 - 3. Nibco #S/T-585-66-LF
 - 4. Milwaukee #UPBA-400S/450S
 - 5. Engineer approved equal.
- B. Bronze two piece full port body, stainless steel ball and stem, RPTFE seats and thrust washer, lever handle, solder or threaded ends.

2.04 PIPE ACCESSORIES

- A. Fittings:
 - 1. All fittings shall be of the same material as the pipe. Material joining the fitting to the pipe shall be free from cracks and shall adhere tightly to each joining surface.
 - 2. All fittings shall be capped with a plug of the same material as the pipe, and gasketed with the same gasket material as the pipe joint or be of material approved by the engineer. The plug shall be able to withstand all test pressures involved without leakage.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to conserve building space and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints or connected equipment.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- H. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors.
- I. Where pipe support members are welded to structural building frame, scrape, brush clean and apply one coat of zinc rich primer to welding.
- J. Install bell and spigot pipe with bell end upstream.
- K. Install valves with stems upright or horizontal, not inverted.
- L. Install water piping to ASME B31.9.
- M. Clean out all sanitary sewers to remove any debris prior to substantial completion.

- N. All cast iron soil pipe shall be installed in accordance with cast iron soil pipe institute handbook (latest edition).
- O. All cast iron soil pipe shall be marked with the trademark of the soil pipe institute.

3.03 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

3.04 ERECTION TOLERANCES

- A. Establish invert elevations, slopes for drainage to 1/8 inch per foot 1% minimum. Maintain gradients.
- B. Slope water piping minimum 0.25% and arrange to drain at low points.

3.05 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flush and clean.
- B. The plumbing contractor is to make sure sanitary sewer lines are running smooth by running a snake through the sanitary sewer lines prior turning the facility over to the owner.
- C. Ensure pH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- D. Inject disinfectant, free chlorine in liquid, powder or tablet form throughout system to obtain 50-to 80 mg/L residual.
- E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15% of outlets.
- F. Maintain disinfectant in system for 24 hours.
- G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- I. Take samples no sooner than 24 hours after flushing from 10% of outlets and from water entry and analyze in accordance with AWWA C651. Submit written report to owner.
- J. Work in this section shall be by a pre-approved water treatment contractor.

3.06 TESTING

- A. Upon completion of a section or of the entire hot and cold water supply system, it shall be tested and proved tight under a water pressure not less than the working pressure under which it is to be used.
- B. The water used for tests shall be obtained from a potable source of supply
- C. Except for plastic piping, a 50 psi air pressure shall be permitted to be substituted for the water test.
- D. In either method of test, the piping shall withstand the test without leaking for a period of not less than 15 minutes.

3.07 UTILITY CONNECTIONS

- A. Connect to existing utility services as shown on the drawings or as required by site conditions.
- B. Before running any new sewer piping, verify elevations where connections are to be made and layout the new sewer. If grades do not allow connection, verify with architect or engineer what procedures to use.
- C. Use caution on sewer extensions so that grades do not become too shallow.

END OF SECTION 22 1116

**SECTION 22 4000
PLUMBING FIXTURES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. See plumbing fixture schedules on drawings.

1.02 RELATED SECTIONS

- A. Specification Section 22 0529 - Hangers and Supports for Plumbing Piping and Equipment
- B. Specification Section 22 1116 - Domestic Plumbing Piping

1.03 REFERENCES

- A. ASME A112.6.1 - Supports for Off-the-Floor Plumbing Fixtures for Public Use
- B. ASME A112.18.1 - Finished and Rough Brass Plumbing Fixture Fittings
- C. ASME A112.19.2 - Vitreous China Plumbing Fixtures
- D. ASME A112.19.5 - Trim for Water-Closet Bowls, Tanks, and Urinals
- E. NSF/ANSI 61 - Drinking Water System Components - Health Effects
- F. NSF/ANSI 372 - Drinking Water System Components - Lead Content

1.04 SUBMITTALS

- A. Product Data: Provide catalog illustrations of fixtures, sizes, rough in dimensions, utility sizes, trim, and finish.
- B. Manufacturer's Instructions: Indicate installation methods and procedures.
- C. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
- D. Warranty: Submit manufacturer's warranty and ensure forms have been completed in owner's name and registered with manufacturer.
- E. The mechanical contractor shall coordinate all fixtures with general construction and cabinetry prior to submitting for review.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.

1.06 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.
- B. Wetted surfaces of brass and bronze components shall contain <0.25% weighted average lead content (lead free) as defined by NSF/ANSI Standards 61 and 372.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Accept fixtures on site in factory packaging. Inspect for damage.
- B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.08 WARRANTY

- A. Provide manufacturer's standard warranty for electric water cooler.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

- B. Verify that electric power is available and of the correct characteristics.
- C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks prior to ordering.
- D. Confirm that hole drillings are of appropriate number and spacing for trim.

3.02 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install each fixture with trap, easily removable for servicing and cleaning.
- C. Provide chrome plated rigid or flexible supplies to fixtures with 1/4 turn loose key stops, reducers and escutcheons.
- D. Install components level and plumb.
- E. Install and secure fixtures in place with wall supports or wall carriers and bolts.
- F. Seal fixtures to wall and floor surfaces with sealant. Color to match fixture.

3.04 INTERFACE WITH OTHER PRODUCTS

- A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.05 ADJUSTING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise or overflow.

3.06 CLEANING

- A. Clean plumbing fixtures and equipment.

END OF SECTION 22 4000

SECTION 23 0050
BASIC HVAC REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Basic HVAC Requirements specifically applicable to Mechanical Division Specification Sections.
- B. Division 23 Specification requirements also include, by reference, all Division 00 and 01 specification sections. This contractor is responsible to review these specification sections. Requirements of these specification sections are included as a part of this contract.

1.02 OWNER OCCUPANCY

- A. The owner will occupy the premises during the construction period.
- B. Limit use of site and premises to allow owner occupancy.
- C. Cooperate with the owner to minimize conflict and to facilitate owner's operations.
- D. Schedule the work to accommodate this requirement.

1.03 REGULATORY REQUIREMENTS

- A. This contractor shall give proper authorities all requisite notices relating to work in their charge, obtain official permits, licenses for temporary construction and pay proper fees for it.
- B. This contractor is to be solely answerable for and shall promptly make good all damage, injury or delay to other contractors, to neighboring premises or to persons or property of the public by themselves, by their employees or through any operation under their charge, whether in the contract or extra work.
- C. No attempt has been made to reproduce in these specifications any of the rules or regulations contained in city, state or federal ordinances and codes pertaining to the work covered by these specifications that the contractor be thoroughly familiar with all such ordinances and codes.
- D. The fact that said various rules, regulations and ordinances are not repeated in this specification does not relieve the contractor of the responsibility of making the entire installation in accordance with the requirement of those authorities having jurisdiction.
- E. All work shall comply with the applicable recommendations of:
 - 1. The National Board of Fire Underwriters
 - 2. American Gas Association
 - 3. The National Fire Protection Association (NFPA)
 - 4. The Occupations Safety and Health Act (OSHA)
 - 5. Current IBC Building Code
 - 6. Current applicable city building codes.
 - 7. Current International Energy Conservation Code
- F. Mechanical: Conform to current mechanical code.
- G. Plumbing: Conform to current plumbing code.
- H. Obtain permits and request inspections from authority having jurisdiction.

1.04 PROJECT/SITE CONDITIONS

- A. Install work in locations shown on the drawings unless prevented by project conditions.
- B. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to work specified in other sections. Obtain permission of owner and architect/engineer before proceeding.
- C. This contractor, before submitting bid, shall visit their the site of the project to familiarize themselves with locations and conditions affecting their work.
- D. It is the intent of this specification that the contractor furnishes all labor and material required completing the installation as outlined in the drawings and specifications. No additions to the

contract price shall be allowed due to the failure of this contractor to properly evaluate the effect of existing conditions on the work to be done under this contract.

- E. Whenever renovation or remodeling or relocation of existing equipment is included in the contract, it is imperative that all locations of existing piping, ductwork, equipment, services and grades be noted on the job site before bid is submitted and that all elevations and grades be verified before roughing in new work.
- F. This contractor shall provide holes as necessary for the installation of their work and in accordance with other specification sections in materials other than the structure.

1.05 SEQUENCING AND SCHEDULING

- A. This contractor shall arrange their work in order that it progresses along with the general construction of the building.
- B. This contractor shall be kept informed as to the work of other trades engaged in the project and shall execute their work in such a manner so as not to delay or interfere with progress of other contractors.
- C. Where space for mechanical and electrical lines and piping is limited, it is imperative that all such trades coordinate their work so as to ensure concealment in space provided. Where conflict exists, the engineer shall decide priority of space. If work is not properly coordinated, the engineer may require removal and relocation of work without additional compensation.

1.06 GUARANTEE

- A. This contractor shall guarantee all of the apparatus, materials, equipment furnished and labor installed under this contract for a period of one year after date of final acceptance, unless a longer period is specified.
- B. Neither final certificate of payment nor any provisions in the contract documents nor partial or complete occupancy of premises by owner shall constitute an acceptance for work not done in accordance with contract documents or relieve the contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship.
- C. Should any defects arise as the result of defective workmanship or material within the guarantee period set forth, this contractor shall make the necessary correction at their own expense.

1.07 ENGINEER APPROVED EQUAL PRODUCTS

- A. When the engineer, at the request of the interested parties, including the contractor, supplier and manufacturer approved "engineer approved equal" products for this project, such products are approved on the assumption that they will equal or exceed the performance of the products specified.
- B. If such products do not do so after being installed on this project, this contractor shall replace or modify the particular product as necessary to equal the performance of the products specified at no expense to the owner, architect or engineer.
- C. Request for "engineer approved equal" products shall be received by the architect/engineer prior to the last addendum being issued. Requests for substitutions received after this date will not be considered. Substitution requests shall clearly state which products are being considered for substitution. Substitution requests shall include all pertinent product information needed to evaluate the substitution as an "equal".
- D. Similar products shall be all of the same manufacturers and style. There is no exception to this unless prior approval has been granted from engineer.

1.08 OWNER'S RIGHT OF SALVAGE

- A. Before beginning construction, this contractor shall check and verify with the owner each item of existing equipment that must be removed.
- B. The owner will designate which items of material or equipment not reused that they may wish to keep. The contractor shall then remove these items with care and store in a location designated by the owner for the owner's disposal.

- C. All other items of equipment to be removed and not specified for reuse in new construction or reserved by the owner for their use shall become the property of the contractor and shall be removed from site.

1.09 PROTECTION AND MAINTENANCE

- A. Where necessary to connect to any existing utility service, this contractor shall contact the owner and shall coordinate any building service connection with the owner so that normal operation to the building is disrupted as little as possible.
- B. Any work to be done in existing structures shall be coordinated with the owner and arrangements made so that traffic flow may be maintained and areas finished where possible before other areas are begun.
- C. This contractor shall protect existing equipment in finished areas from dirt, dust and damage as a result of their work.
- D. Coordinate protection requirements with department heads before beginning construction.
- E. Protect any building openings from unauthorized entry. Coordinate with owner where building entry must be controlled.

1.10 DEMOLITION

- A. This contractor shall be responsible for the demolition and removal of all existing mechanical elements within the project area except as follows:
 - 1. Elements shown on the drawings as "existing to remain and/or to be relocated".
 - 2. Elements serving adjacent areas.
 - 3. Elements required for the support of the newly remodeled areas.
 - 4. All elements to be removed are subject to the Owner's Right of Salvage.
- B. Preserve services to the existing facility. Extend/reroute/reconnect existing systems as required providing for the continued function of these systems.

1.11 CUTTING AND PATCHING

- A. This contractor shall do all cutting and patching necessary for the installation of their work in all existing and new buildings unless otherwise noted.
- B. This contractor shall arrange for openings in the building as required for the installation of equipment furnished under this contract. Where ductwork or piping must be extended or changed, patching with concrete will be done in the building. Patching shall be at both the top and bottom of sleeves where above grade.
- C. In areas where the integrity of new or existing fire separation assembly/wall is compromised by the work, contractor shall be responsible to patch and/or seal openings as necessary to maintain/return fire separation to rating as required by applicable codes.
- D. This contractor shall do all cutting and patching required for their work beyond the remodeled areas unless otherwise noted. All finish work shall include patching to match existing adjacent surfaces. Painting shall be by others.

1.12 CLEANING AND RUBBISH

- A. This contractor, upon completion of their work, shall remove all rubbish and debris resulting from their operation and shall remove it from site at their own expense.
- B. In so far as their work is concerned, all equipment shall be cleaned and the premises left in first class condition.
- C. This contractor shall maintain the work area each day to prevent hazardous accumulation of waste from their work.

1.13 SEALING AND PENETRATION

- A. Clearance around the piping passing through fire or smoke rated construction shall be sealed to maintain the rated integrity of the construction (1 hr. 2 hrs. etc.). One and two-hour rated assemblies are to be patched on both sides of the assembly.

- B. This contractor shall verify rating and location of all such construction with the architectural drawings and seal all penetrations.
- C. Manufacturer offering products to comply with the requirements include the following:
 - 1. Dow Corning "Silicone RTV Foam"
 - 2. 3-M Corporation "Fire Barrier Caulk and Putty"
 - 3. Thomas & Betts "Flame Safe Fire Stop System"
- D. Installation of these products to be in strict accordance with manufacturer's recommendations and architectural specification sections or equivalent fire stopping architectural specification section.
- E. This contractor shall submit shop drawings showing approved sealing assemblies to be utilized on this project.

1.14 ELECTRICAL CONNECTIONS

- A. This contractor shall turn over all magnetic starters, thermal protective switches, and speed changing switches furnished under this contract for all motor driven equipment to the electrical contractor who will install such starters and switches and wire them to their respective motors as a part of the electrical contract.

1.15 HAZARDOUS MATERIALS

- A. If the contractor stores any hazardous solvents or other materials on the site, they shall obtain copies of the safety data sheets for the materials and post them on the site. The contractor shall inform the owner and all employed of any potential exposure to this material.
- B. At no time shall any product containing asbestos be incorporated into the work.
 - 1. If asbestos materials are encountered, report to the owner. The owner will be responsible for asbestos removal.

1.16 RECORD DRAWINGS

- A. This contractor shall provide at the conclusion of the project one clean, non-torn, neat, and legible "as-built" set of drawings to the owner. These drawings shall show the routing of pipes, ductwork and equipment drawn in at scaled locations. All dimensions indicated shall be referenced to a column line. A set of construction blue prints will be furnished for this work.
- B. All mechanical systems installed shall be shown on the "as-built" drawings. This includes all addendum items and change orders.
- C. Refer to respective architectural specification section for additional information.
- D. This contractor shall update these drawings during the project at least every week.

1.17 REVIEW OF MATERIALS

- A. This contractor shall submit to the engineer for review one (1) electronic copy giving a complete list of materials and equipment they propose to furnish. The brochure shall contain complete information as to the make of equipment, type, size, capacities, dimensions and illustration. One of these returned copies shall be kept on the job at all times.
- B. Checking of submittal drawings by the engineer does not relieve the contractor of the responsibility for the accuracy of such drawings and for their conformity to drawings and specifications unless the contractor notifies engineer in writing of such deviation at time such drawings are furnished.
- C. All submittals shall have the date marked on them when the contractor receives them from the supplier. Submittals shall be submitted through the contractor and shall not come direct from the supplier to the architect or engineer.
- D. This contractor shall mark the date and sign each set that they have checked each of them in their entirety before submitting to the engineer. Submittals that are not dated and signed by the contractor will not be accepted, or checked and will be marked "resubmit" and sent back to the contractor.

1.18 TEST OF SYSTEMS

- A. This contractor, before concealed, shall test all systems installed under this contract as called for in these specifications and as required by local codes. Tests shall be made in the presence of the engineer, local authorities or their duly authorized representative. Any defects discovered in testing shall be corrected and the tests repeated until all defects are eliminated.
- B. This contractor shall be held responsible for all damage resulting from defects in the system.
- C. At the conclusion of construction (before any covering up, painting or finishing) each element of the system shall be thoroughly tested against leakage, with appropriate pressure tests, as outlined herein and in appropriate sections of the specifications. All testing shall be hydrostatic unless permission is granted otherwise.
 - 1. Water: 100 psi maintained 8 hours
 - 2. Under Floor Pipes: 200 psi maintained 8 hours
- D. Fluid lines other than the above 1.5 times operating with a minimum pressure of 60 psig.
- E. After completion of installation, the systems shall be given tests under full operating conditions and pressures and all adjustments shall be made to make the system operative as required. All safety devices shall be tested for correct operation.

1.19 SCOPE OF WORK

- A. All work shall be performed by well-qualified and licensed mechanics with a thorough knowledge of the various systems involved in this building. It shall be this contractor's responsibility to see that their mechanics are familiar with all the various codes and tests applicable to this work.
- B. All equipment shall be new and of the type as specified by the engineer unless otherwise noted in these specifications or on the drawings to remain and or be reused.
- C. The intent of the drawings and specifications is for complete installation of the systems outlined in the drawings and specifications so that at the conclusion of construction the system will be turned over to the owner complete and ready for safe and efficient operation.
- D. This contractor shall be required to furnish and install all such items normally included on systems of this type, which, while not mentioned directly herein or on the drawings are obviously essential to the installation and operation of the system and which are normally furnished on quality installation of this type. The drawings and specifications cannot deal individually with the many minute items that may be required by the nature of the systems.
- E. If there is a discrepancy between the drawings and the specifications or within either document, the more stringent requirement shall be estimated unless brought to the engineer's attention and an addendum is issued for clarification.
- F. The HVAC Contractor shall establish system elevations prior to fabrication and installation. The HVAC Contractor shall coordinate elevations with other trades. All elevations shall be coordinated with all trades in the field prior to installation. When a conflict between trades arises, the design team shall be notified immediately prior to further installation however priority shall be as follows:
 - 1. Lighting Fixtures
 - 2. Gravity flow piping, including steam and condensate
 - 3. Electrical bus duct
 - 4. Sheet metal
 - 5. Cable trays, including access space
 - 6. Other piping
 - 7. Conduits and wireway

1.20 VERIFICATION OF ELEVATION OF EXISTING LINES

- A. This contractor shall before starting any new work, verify the elevations of all existing piping to which they must connect under this contract. The contractor shall report any discrepancies between drawing elevations and actual elevations to the engineer before proceeding with the

work. Failure of the contractor to do so shall make them liable for the cost of extra work involved.

1.21 DAILY HOUSEKEEPING

- A. At the end of each working day, this contractor shall remove all of their debris, rubbish, tools and surplus materials from the project work area. The work area shall be broom clean and left in a neat and orderly condition. The contractor for the removal of debris from the project shall not use the owner's waste disposal facility.
- B. At end of construction, all equipment shall be cleaned and the premises left in first class condition as far as this contractor's work is concerned.

1.22 CLEANING OF MECHANICAL SYSTEMS

- A. The mechanical contractor shall clean and passivate all piping systems in accordance with Specification Section 23 2500 Cleaning & Treatment of Hydronic Systems. The system shall be left free of all construction debris, dirt, grit, oils, etc. The passivation procedure shall provide protection for all ferrous and non-ferrous components of the system.
- B. Where connections are made to existing piping systems, this contractor shall provide isolation valves, threaded tees, etc., as required to facilitate the cleaning and testing of all new piping.
- C. This contractor shall thoroughly clean all rust, grease, plaster, cement, etc., from all equipment, ductwork and piping furnished and installed by them as required to leave surfaces suitable for finish painting.
- D. This contractor shall keep all pipes, ducts, etc., plugged, drained or otherwise protected during construction. All items of mechanical equipment shall be suitably protected and upon completion of project shall be equal to new condition.

1.23 ALTERNATES

- A. Refer to General Specification Sections for alternate bid description.

1.24 DIGITAL MEDIA AGREEMENT

- A. Computer Aided Drafting (CAD) documents may be available to the contractor for some uses. Contact the engineer prior to bidding to determine what information is available to be transmitted to the contractor in digital form.
- B. When documents are determined to be available, and as requested by the contractor, they will be transmitted upon the completion and execution of the MODUS digital media agreement. A service fee for each document transmitted will be assessed to the contractor. Documents will be transmitted upon payment receipt. Current service fee is \$100.00 per CAD sheet.

1.25 SECURE NETWORKABLE DEVICES

- A. Update network devices to the most current software/firmware.
- B. Change default password of all networkable devices.
 - 1. Passwords shall have at least eight characters.
 - 2. Include uppercase and lowercase letters, numerals, and special characters
- C. Supply MAC address and serial number of all networkable devices.
- D. Work with the Owner's IT department to align to existing IT standards.
- E. Provide to the owner a printed and/or electronic spreadsheet log of all network information including, IP addresses, MAC addresses, logins and password information during system training.

1.26 SYSTEM CONFIGURATION AND PROGRAMMING FILES

- A. Supply system configuration and programming files where export is available.
- B. Supply uncompiled programming for systems applicable.
- C. All configuration and programming shall be property of the owner at conclusion of the project.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION 23 0050

SECTION 23 0529

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe hangers and supports
- B. Accessories

1.02 RELATED SECTIONS

- A. Specification Section 23 2113 - Hydronic Piping

1.03 REFERENCES

- A. ASME B31.1 - Power Piping
- B. ASME B31.9 - Building Services Piping
- C. ASTM F708 - Design and Installation of Rigid Pipe Hangers
- D. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer
- E. MSS SP69 - Pipe Hangers and Supports - Selection and Application
- F. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices

1.04 SUBMITTALS

- A. Product Data: Provide manufacturers catalog data including load capacity.
- B. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.
- C. Manufacturer's Installation Instructions: Indicate special procedures and assembly of components.

1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable code for support of piping.

PART 2 PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

- A. Manufacturers:
 - 1. Anvil International International
 - 2. Cooper B-Line/Tolco
 - 3. Engineer approved equal.
- B. Hydronic Piping:
 - 1. Conform to ASME B31.9; ASTM F708
 - 2. Hangers for Pipe Sizes 1/2" to 1-1/2": Carbon steel, adjustable swivel, split ring. Anvil International Figure 104.
 - 3. Hangers for Cold Pipe Sizes 2" and Over: Carbon steel, adjustable, clevis. Anvil International Figure 260.
 - 4. Hangers for Hot Pipe Sizes 2" to 4": Carbon steel, adjustable, clevis. Anvil International Figure 260.
 - 5. Hangers for Hot Pipe Sizes 6" and Over: Adjustable steel yoke, cast iron roll, single hanger. Anvil International Figure 181.
 - 6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 - 7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6" and Over: Steel channels with welded spacers and hanger rods, cast iron roll. Anvil International Figure 175.
 - 8. Wall Support for Pipe Sizes to 3 Inches: Cast iron bracket. Anvil International Figure 213.
 - 9. Wall Support for Pipe Sizes 4" and Over: Welded steel bracket and wrought steel clamp. Anvil International Figure 195.
 - 10. Wall Support for Hot Pipe Sizes 6" and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll. Anvil International Figure 195 and 181.

11. Vertical Support: Steel riser clamp. Anvil International Figure 261.
12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support. Anvil International Figure 264.
13. Floor Support for Hot Pipe Sizes to 4": Cast iron adjustable pipe saddle, lock nut, nipple, floor flange and concrete pier or steel support. Anvil International Figure 264.
14. Floor Support for Hot Pipe Sizes 6" and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support. Anvil International Figure 274.
15. Copper Pipe Support: Carbon steel ring, adjustable, copper plated. Anvil International Figure 97.

2.02 ACCESSORIES

- A. Hanger Rods: Mild steel threaded both ends, threaded one end or continuous threaded.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.02 PIPE HANGERS AND SUPPORTS

- A. Support horizontal piping as scheduled.
- B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- C. Place hangers within 12 inches of each horizontal elbow.
- D. Use hangers with 1-1/2 inch minimum vertical adjustment.
- E. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- F. Support riser piping independently of connected horizontal piping.
- G. Provide copper plated hangers and supports for copper piping.
- H. Design hangers for pipe movement without disengagement of supported pipe.
- I. Support vertical piping every ten feet or on every floor.

3.03 SCHEDULES

HANGER ROD	MAX. HANGER SPACING	DIAMETER
Pipe Size	Feet	Inches
1/2 to 1-1/4	6.5	3/8
1-1/2 to 2	10.0	3/8
2-1/2 to 3	10.0	1/2
4 to 6	10.0	5/8

END OF SECTION 23 0529

SECTION 23 0553
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates
- B. Tags
- C. Pipe markers
- D. Labels

1.02 REFERENCES

- A. ASME A13.1 - Scheme for the Identification of Piping Systems

1.03 SUBMITTALS

- A. Submit list of wording, symbols, letter size, and color-coding for mechanical identification.
- B. Product Data: Provide manufacturers catalog literature for each product required.
- C. Manufacturer's Instructions: Indicate installation instructions, special procedures, and installation.
- D. Project Record Documents: Record actual locations of tagged valves, include valve tag numbers.

PART 2 PRODUCTS

2.01 NAMEPLATES

- A. Description: Laminated three-layer plastic with engraved black letters on light contrasting background color.

2.02 TAGS

- A. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

2.03 PIPE MARKERS

- A. Color and Lettering: Conform to ASME A13.1.
- B. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings indicating flow direction arrow and identification of fluid being conveyed.

2.04 LABELS

- A. Description: Laminated Mylar, size 1.9" x 0.75" adhesive backed with printed identification.

PART 3 EXECUTION

3.01 PREPARATION

- A. De-grease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

- A. Install identifying devices after completion of coverings and painting.
- B. Install plastic nameplates with corrosive-resistant mechanical fasteners or adhesive.
- C. Install labels with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer. Apply paint primer before applying labels for unfinished canvas covering.
- D. Install tags using corrosion resistant chain. Number tags consecutively by location.
- E. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.
- F. Identify control panels and major control components outside panels with plastic nameplates.
- G. Identify valves in main and branch piping with tags.

- H. Identify air terminal units and radiator valves with numbered tags.
- I. Tag automatic controls, instruments, and relays. Key to control schematic.
- J. Identify piping, concealed or exposed with plastic tape pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure and at each obstruction. Identify on both sides of any wall.

END OF SECTION 23 0553

SECTION 23 0593
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems
- B. Testing, adjustment, and balancing of hydronic systems

1.02 REFERENCES

- A. AABC - National Standards for Total System Balance
- B. ADC - Test Code for Grilles, Registers, and Diffusers
- C. ASHRAE 111 - Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air-conditioning, and Refrigeration Systems
- D. NEBB - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems
- E. SMACNA - HVAC Systems Testing, Adjusting, and Balancing

1.03 SUBMITTALS

- A. Submit name of adjusting and balancing agency for approval within 30 days after award of Contract.
- B. Field Reports: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- C. Prior to commencing work, submit report forms or outlines indicating adjusting, balancing, and equipment data required.
- D. Submit draft copies of report for review prior to final acceptance of project. Provide final copies for Architect/Engineer and for inclusion in operating and maintenance manuals.
- E. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
- F. Include detailed procedures, agenda, sample report forms and copy of AABC National Project Performance Guaranty prior to commencing system balance.
- G. Test Reports: Indicate data on AABC National Standards for Total System Balance Forms.

1.04 PROJECT RECORD DOCUMENTS

- A. Record actual locations of flow measuring stations, balancing valve, and rough setting.

1.05 QUALITY ASSURANCE

- A. Perform total system balance in accordance with AABC National Standards for Field Measurement and Instrumentation, Total System Balance.
- B. Maintain one copy of each document on site.

1.06 QUALIFICATIONS

- A. Independent agency specializing in the testing, adjusting and balancing of systems specified in this section with minimum three years experience.
- B. Perform work under supervision of AABC Certified Test and Balance Engineer or NEBB Certified Testing, Balancing and Adjusting Supervisor.

1.07 SEQUENCING

- A. Sequence work to commence after completion of systems and schedule completion of work before substantial completion of project.

1.08 SCHEDULING

- A. Schedule and provide assistance in final adjustment and test of life safety system with the fire authority.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 5. Duct systems are clean of debris.
 - 6. Fans are rotating correctly.
 - 7. Fire, smoke, and volume dampers are in place and open.
 - 8. Air coil fins are cleaned and combed.
 - 9. Access doors are closed and duct end caps are in place.
 - 10. Air outlets are installed and connected.
 - 11. Duct system leakage is minimized.
 - 12. Hydronic systems are flushed, filled, and vented.
 - 13. Pumps are rotating correctly.
 - 14. Proper strainer baskets are clean and in place.
 - 15. Service and balance valves are open.
- B. Submit field reports. Report defects and deficiencies noted during performance of services that prevents system balance.
- C. Beginning of work means acceptance of existing conditions.

3.02 PREPARATION

- A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to the engineer to facilitate spot checks during testing.
- B. Provide additional balancing devices as required.

3.03 INSTALLATION TOLERANCES

- A. Air Handling Systems: Adjust to within +/- 5% of design for supply systems and +/- 10% of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within + 10% and - 5% of design to space. Adjust outlets and inlets in space to within +/- 10% of design.
- C. Hydronic Systems: Adjust to within +/- 10% of design.

3.04 ADJUSTING

- A. Ensure recorded data represents actual measured or observed conditions.
- B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- E. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the owner.

- F. Check and adjust systems approximately six months after final acceptance and submit report.

3.05 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extent those adjustments do not create objectionable air motion or sound levels. Affect the volume control by duct internal devices (such as dampers and splitters).
- F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50% loading of filters.
- I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum airflow rate, full cooling, and at minimum airflow rate, full heating.
- L. Adjust airflow switches for proper operation for water applications.

3.06 WATER SYSTEM PROCEDURE

- A. Adjust water systems to provide required or design quantities.
- B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow-metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.
- C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
- D. Effect the system balance with automatic control valves fully open to heat transfer elements.
- E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.
- F. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

3.07 SCHEDULES

- A. Equipment Requiring Testing, Adjusting, and Balancing:
 - 1. HVAC Pumps
 - 2. Energy Recovery Units
 - 3. Terminal Heat Transfer Units
 - 4. Air Terminal Units
 - 5. Air Inlets and Outlets
- B. Report Forms
 - 1. Title Page:

- a. Name of Testing, Adjusting, and Balancing Agency
- b. Address of Testing, Adjusting, and Balancing Agency
- c. Telephone number of Testing, Adjusting, and Balancing Agency
- d. Project Name
- e. Project Location
- f. Project Architect
- g. Project Engineer
- h. Project Contractor
- i. Project Altitude
- j. Report Date
2. Summary Comments:
 - a. Design versus final performance.
 - b. Notable characteristics of system.
 - c. Description of systems operation sequence.
 - d. Summary of out door and exhaust flows to indicate amount of building pressurization.
 - e. Nomenclature used throughout report.
 - f. Test conditions.
3. Instrument List:
 - a. Instrument
 - b. Manufacturer
 - c. Model number
 - d. Serial number
 - e. Range
 - f. Calibration date
4. Electric Motors:
 - a. Manufacturer
 - b. Model/Frame
 - c. HP/BHP
 - d. Phase, voltage, amperage; nameplate, actual, no load
 - e. RPM
 - f. Service factor
 - g. Starter size, rating, heater elements
 - h. Sheave Make/Size/Bore
5. V-Belt Drive:
 - a. Identification/location
 - b. Required driven RPM
 - c. Driven sheave, diameter and RPM
 - d. Belt, size and quantity
 - e. Motor sheave diameter and RPM
 - f. Center to center distance, maximum, minimum, and actual
6. Pump Data:
 - a. Identification/number
 - b. Manufacturer
 - c. Size/Model
 - d. Impeller
 - e. Service
 - f. Design flow rate, pressure drop, BHP
 - g. Actual flow rate, pressure drop, BHP
 - h. Discharge pressure
 - i. Suction pressure
 - j. Total operating head pressure
 - k. Shut off, discharge and suction pressures
 - l. Shut off, total head pressure
7. Cooling Coil Data:

- a. Identification/Number
 - b. Location
 - c. Service
 - d. Manufacturer
 - e. Air flow, design and actual
 - f. Entering air DB temperature, design and actual
 - g. Entering air WB temperature, design and actual
 - h. Leaving air DB temperature, design and actual
 - i. Leaving air WB temperature, design and actual
 - j. Water flow, design and actual
 - k. Water pressure drop, design and actual
 - l. Entering water temperature, design and actual
 - m. Leaving water temperature, design and actual
 - n. Air pressure drop, design and actual
8. Heating Coil Data:
- a. Identification/Number
 - b. Location
 - c. Service
 - d. Manufacturer
 - e. Air flow, design and actual
 - f. Water flow, design and actual
 - g. Water pressure drop, design and actual
 - h. Entering water temperature, design and actual
 - i. Leaving water temperature, design and actual
 - j. Entering air temperature, design and actual
 - k. Leaving air temperature, design and actual
 - l. Air pressure drop, design and actual
9. Electric Heat Duct:
- a. Manufacturer
 - b. Identification/Number
 - c. Location
 - d. Model number
 - e. Design kW
 - f. Number of stages
 - g. Phase, voltage, amperage
 - h. Test voltage (each phase)
 - i. Test amperage (each phase)
 - j. Air flow, specified and actual
 - k. Temperature rise, design and actual
10. Air Moving Equipment:
- a. Location
 - b. Manufacturer
 - c. Model number
 - d. Serial number
 - e. Arrangement/Class/Discharge
 - f. Air flow, specified and actual
 - g. Return air flow, specified and actual
 - h. Outside air flow, specified and actual
 - i. Total static pressure (total external), specified and actual
 - j. Inlet pressure
 - k. Discharge pressure
 - l. Sheave make/size/bore
 - m. Number of belts/make/size
 - n. Fan RPM

11. Return Air/Outside Air Data:
 - a. Identification/Location
 - b. Design air flow
 - c. Actual air flow
 - d. Design return air flow
 - e. Actual return air flow
 - f. Design outside air flow
 - g. Actual outside air flow
 - h. Return air temperature
 - i. Outside air temperature
 - j. Required mixed air temperature
 - k. Actual mixed air temperature
 - l. Design outside/return air ratio
 - m. Actual outside/return air ratio
12. Exhaust Fan Data:
 - a. Location
 - b. Manufacturer
 - c. Model number
 - d. Serial number
 - e. Air flow, specified and actual
 - f. Total static pressure (total external), specified and actual
 - g. Inlet pressure
 - h. Discharge pressure
 - i. Sheave Make/Size/Bore
 - j. Number of Belts/Make/Size
 - k. Fan RPM
13. Duct Traverse:
 - a. System zone/branch
 - b. Duct size
 - c. Area
 - d. Design velocity
 - e. Design air flow
 - f. Test velocity
 - g. Test air flow
 - h. Duct static pressure
 - i. Air temperature
 - j. Air correction factor
14. Terminal Unit Data:
 - a. Manufacturer
 - b. Type, constant, variable, single, dual duct
 - c. Identification/number
 - d. Location
 - e. Model number
 - f. Size
 - g. Minimum static pressure
 - h. Minimum design air flow
 - i. Maximum design air flow
 - j. Maximum actual air flow
 - k. Inlet static pressure
 - l. Air temperature rise across reheat coil
15. Air Distribution Test Sheet:
 - a. Air terminal number
 - b. Room number/location
 - c. Terminal type

- d. Terminal size
- e. Area factor
- f. Design velocity
- g. Design air flow
- h. Test (final) velocity
- i. Test (final) air flow
- j. Percent of design air flow

END OF SECTION 23 0593

SECTION 23 0713
DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fiberglass (rigid board)
- B. Fiberglass (flexible duct wrap)

1.02 RELATED SECTIONS

- A. Specification Section 23 3100 - HVAC Ducts and Casings
- B. Specification Section 23 3300 - Air Duct Accessories

1.03 REFERENCES

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- B. ASTM C518 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
- C. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation
- D. ASTM C1071 - Standard Specification for Thermal and Acoustical Insulation (Fiberglass, Duct Lining Material)
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
- F. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials
- G. ASTM E162 - Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source
- H. ASTM C612: Standard Specification for Mineral Fiber Block and Board Thermal Insulation
- I. ASTM C1290: Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts
- J. ASTM C1338: Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings
- K. NAIMA National Insulation Standards
- L. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials
- M. SMACNA - HVAC Duct Construction Standards - Metal and Flexible
- N. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials

1.04 SUBMITTALS

- A. Product Data: Provide product description, thermal characteristics, and list of materials and thickness for each service and locations.
- B. Manufacturer's Installation Instructions: Indicate procedures that ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section approved by manufacturer.

1.06 REGULATORY REQUIREMENTS

- A. Materials: Flame spread/smoke developed rating of 25/50 in accordance with ASTM E84.
- B. Identification: External duct insulation and factory insulated flexible duct shall be legibly printed or identified at intervals not greater than 36 inch with name of manufacturer, the thermal

resistance R-value at the specified thickness; and the flame spread and smoke developed indexes of the composite material.

1.07 DELIVERY, STORAGE AND PROTECTION

- A. Deliver, store, protect and handle products to site.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- C. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 FIBERGLASS (RIGID BOARD)

- A. Manufacturers:
 - 1. Johns Manville Spin-Glas
 - 2. Owens Corning
 - 3. Knauff
 - 4. Certainteed
 - 5. Engineer approved equal.
- B. Insulation: ASTM C612; semi-rigid board semi-rigid fiberglass boards with a thermosetting resin binder.
 - 1. "K" Value: ASTM C518, 0.23 at 75 deg F.
 - 2. Maximum Service Temperature: 450 deg F.
 - 3. Maximum Moisture Absorption: Less than 5% by weight.
 - 4. Density: 3.0 lb/cu. ft.
 - 5. Maximum Flame Spread/Smoke Developed Index: ASTM E84; 25/50
- C. Adhesive: As recommended by the manufacturer.
- D. Fasteners: Galvanized steel spot-welded PIN.
- E. Vapor Barrier Jacket:
 - 1. All Service Jacket (ASJ): White laminated foil reinforced with fiber glass yarn. ASTM E96 permeance; 0.02 perm. Pressure sensitive tape shall match the insulation facing.

2.02 FIBERGLASS (FLEXIBLE DUCT WRAP)

- A. Manufacturers:
 - 1. Owens Corning
 - 2. Knauff
 - 3. Johns Manville
 - 4. CertainTeed
 - 5. Engineer approved equal.
- B. Insulation: ASTM C1290; flexible, noncombustible blanket.
 - 1. "K" Value: ASTM C518, 0.27 at 75 deg F.
 - 2. Installed R-value (compressed to 25%) for 1-1/2": 4.5
 - 3. Maximum Service Temperature: ASTM C411; 250 deg F.
 - 4. Maximum Moisture Absorption: ASTM C1104; 5% by weight
 - 5. Density: 1.0 lb./cu. ft. (0.75 lb/cu ft for attic insulation)
 - 6. Microbial Growth: ASTM C1338; does not support the growth of mold, fungi and bacteria.
 - 7. Maximum Flame Spread/Smoke Developed Index: ASTM E84; 25/50
- C. Vapor Barrier Jacket:
 - 1. Kraft paper reinforced with fiberglass yarn and bonded to aluminized film.

2. Maximum Moisture Vapor Transmission: ASTM E96; 0.02 perm.

- D. Vapor Barrier Tape Pressure sensitive tape approved by the manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that ductwork has been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed and dry.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Insulated Ductwork Conveying Air Below Ambient Temperature:
 1. Provide insulation with vapor barrier jackets.
 2. Finish with tape and vapor barrier jacket.
 3. Continue insulation through walls, sleeves, hangers and other duct penetrations.
 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, expansion joints, reheat coils, and any other item exposed to ductwork air temperature.
- C. Insulated Ductwork Conveying Air Above Ambient Temperature:
 1. Provide with standard vapor barrier jacket.
 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- D. Exterior Ductwork Insulation Application:
 1. Secure insulation with vapor barrier with adhesive. Seal vapor barrier jacket joints with vapor barrier tape to match jacket.
 2. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging.
 3. Lift ductwork off trapeze hangers and insert spacers.
 4. Seal vapor barrier penetrations with vapor barrier adhesive and tape.
 5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

3.03 SCHEDULES

FIBERGLASS RIGID BOARD

DUCTWORK	THICKNESS
Supply Ducts (Attic)	1-1/2"
Return Ducts (Attic)	1-1/2"
Exhaust Ducts (Attic)	1-1/2"
Outdoor Intake Ducts (Attic)	2"
Outdoor Air Plenums	2"

FIBERGLASS FLEXIBLE DUCT WRAP

DUCTWORK	THICKNESS
Supply Ducts (except attic)	1-1/2"

END OF SECTION 23 0713

SECTION 23 0719
HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fiberglass

1.02 RELATED SECTIONS

- A. Specification Section 23 2113 - Hydronic Piping

1.03 REFERENCES

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus
- B. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement
- C. ASTM C240 - Standard Test Methods of Testing Cellular Glass Insulation Block
- D. ASTM C449/C449M - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement
- E. ASTM C518 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
- F. ASTM C547 - Standard Specification for Mineral Fiber Preformed Pipe Insulation
- G. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation
- H. ASTM C610 - Standard Specification for Expanded Perlite Block and Pipe Thermal Insulation
- I. ASTM D1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
- J. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics
- K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
- L. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials
- M. NAIMA National Insulation Standards
- N. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials
- O. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials

1.04 SUBMITTALS

- A. Product Data: Provide product description, thermal characteristics, list of materials, and thickness for each service and locations.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to maximum flame spread/smoke developed rating of 25/50 in accordance with ASTM E84.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Accept materials on site, labeled with manufacturer's identification, product density and thickness.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 FIBERGLASS

- A. Manufacturers:
 - 1. Johns Manville Micro-Lok HP
 - 2. Owens Corning
 - 3. Knauf
 - 4. Engineer approved equal.
- B. Insulation: ASTM C547 rigid molded, noncombustible
- C. "K" Value: ASTM C335, 0.25 at 75 deg F.
- D. Minimum Service Temperature: 0 deg F.
- E. Maximum Service Temperature: 800 deg F.
- F. Maximum Moisture Absorption: <5% by weight
- G. Vapor Barrier Jacket: ASTM C1136, white Kraft paper with fiberglass yarn, bonded to aluminized film.
- H. Moisture Vapor Transmission: ASTM E96; 0.02 perm inches.
- I. Secure with self-sealing longitudinal laps and butt strips.
- J. Surface Burning: ASTM E84; Flame Spread-25, Smoke Developed-50
- K. VOC Content: ASTM D5116; 0.15 g/l

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry with foreign material removed.

3.02 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Exposed Piping: Locate insulation and cover seams in least visible locations.
- C. Insulated Dual Temperature Pipes or Cold Pipes Conveying Fluids Below Ambient Temperature:
 - 1. Provide vapor barrier jackets, factory applied or field applied.
 - 2. Insulate fittings, joints and valves with molded insulation of like material and a thickness as adjacent pipe.
 - 3. PVC fitting covers may be used.
 - 4. Continue insulation through walls (unless in firewall sleeves), pipe hangers and other pipe penetrations.
 - 5. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
 - 6. Vapor seal insulation ends every 20 feet.
- D. Insulated Pipes Conveying Fluids Above Ambient Temperature:
 - 1. Provide standard jackets with vapor barrier, factory applied.
 - 2. Insulate fittings, joints and valves with insulation of like material and thickness as adjoining pipe.
 - 3. PVC fitting covers may be used.
 - 4. Hot piping conveying fluids 140 deg F or less do not insulate flanges and unions at equipment, but level and seal ends of insulation.
 - 5. Hot piping conveying fluids over 140 deg F, insulate flanges and unions at equipment.
- E. Inserts and Shields:
 - 1. Manufacturers:
 - a. Jeff Company/Buckaroo

- b. Armacell
 - c. Cooper/Eaton
 - d. TPS
 - e. Engineer approved equal.
- 2. Shields: Galvanized saddle with flared edges between pipe hangers or pipe hanger rolls and inserts.
 - 3. Insert Location: Between support shield and piping and under the vapor barrier and finish jacket.
 - 4. Insert Configuration: Minimum six inch (6") long of same thickness and contour as adjoining insulation; may be factory fabricated.
 - 5. Insert Type:
 - a. Polystyrene and Fiberglass Insulation: 360 degree polyisocyanurate or phenolic foam cylindrical insert capable of supporting piping system. Pre-fabricated, insulated and jacketed supports are acceptable. Blocks, plugs, or wood material are not acceptable.
- F. Insulation shall be continuous at all hangers. Hanger shall not be in direct contact with pipe.

3.03 TOLERANCE

- A. Substituted insulation materials shall provide thermal resistance within 10% at normal conditions, as materials indicate.

3.04 SCHEDULE

FIBERGLASS INSULATION

PIPING SYSTEMS	PIPE SIZE	THICKNESS
Heating Water Supply and Return:	Less than 1.5"	1.5"
Heating Water Supply and Return:	1.5" and larger	2"
Chilled Water Supply/Return	Less than 6"	1"
Chilled Water Supply/Return	6" and larger	1.5"
Pump Bodies, Valves, and Devices	ALL	1"
Cooling Coil Condensate Drains:	ALL	1"

END OF SECTION 23 0719

SECTION 23 0913

DDC INSTRUMENTS AND CONTROL DEVICES FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Control valves
- B. Input/output sensors for DDC controls

1.02 RELATED SECTIONS

- A. Specification Section 23 0923 - DDC System
- B. Specification Section 23 0993 - Sequence of Operation for HVAC Controls

1.03 REFERENCES

- A. AMCA 500D - Laboratory Methods of Testing Dampers for Ratings
- B. NFPA 70 - National Electrical Code
- C. NFPA 90A - Installation of Air Conditioning and Ventilation Systems

1.04 SUBMITTALS

- A. Shop Drawings:
 - 1. Trunk cable schematic showing Tier #1, Tier #2 and Tier #3 conductors. These schematics must show all Tier #1, Tier #2 and Tier #3 equipment and controllers added by or affected by this project, the location of each device and the location of power circuits for each device.
 - 2. Drawings of connected input and output points. These drawings must show the input or output device, terminal points on the input or output device, the controller that the device connects to, terminal points on the controller and intermediate connections such as terminal blocks.
 - 3. Drawings of location of control components, including sensors not close to their mechanical system (i.e., room temperature sensors, duct mounted sensors) and control enclosures. The locations may be shown on copies of the project's mechanical system drawings.
- B. Descriptive data of operating, user and application software located at Tier #1, Tier #2 and Tier #3. If existing software affects the controls installed for this project, include descriptive data of that software.
- C. Control System Components:
 - 1. Front and side views of enclosures with overall dimensions and conduit entrance locations.
 - 2. Voltage, amp draw, MOCP and MCA of the controllers and attached devices.
 - 3. Ambient conditions to include temperature and relative humidity allowed for storage and operation of the controllers and attached devices.
 - 4. Listed Marks from an OSHA nationally recognized testing laboratory that comply with the listing requirements in Specification Section 23 0923 and Specification Section 23 0993.
- D. Sequence of operation that outlines the programming running in the Tier #2 Tier #3 controllers, both programmable and application specific, and shows compliance with the sequence of control published in Specification Section 23 0993 and on the construction drawings. The sequence may be presented in a narrative or flow chart format.
- E. Schedule of valves indicating size, flow and pressure drop for each valve. Demonstrate the valves' materials of construction, static pressure rating, pressure drop rating and close off pressure rating using the submitted actuator.
- F. Schedule of dampers indicating size, blade arrangement and pressure drop at the design CFM. Demonstrate the dampers' materials of construction, FPM at design CFM and shaft torque at design CFM.
- G. Closeout:

1. Record actual location of control components, including sensors not close to their mechanical system (i.e., room temperature sensors, duct mounted sensors) and control enclosures. Show these locations on marked up project mechanical system drawings and / or the shop drawings.
2. Revise shop drawings to reflect the as installed system and the final sequences of operation.
3. Routine preventative maintenance schedule that follows NEMA ICS 1.3 - Preventative Maintenance of Industrial Control and Systems Equipment. Include instructions for operating controllers and describe the operating limits that must be maintained to prevent hazardous or unsafe conditions.
4. Provide manufacturers' warranties in writing. All equipment provided or furnished by the FMS contractor must be warranted as required in the project specification. Make out the warranties in owner's name and register with the equipment's manufacturer.

1.05 QUALITY ASSURANCE

- A. The installer must be a company specializing in applying the work of this section with a minimum of five years experience. The installer may be a subcontractor with the minimum five years experience with their work overseen and directed by the Facility Management System (FMS) contractor.
- B. Any electrician installing electrical circuits must be licensed in Iowa as a Class A or Class B Master Electrician or must be licensed in Iowa as a Class A or B Journeyman Electrician and be employed either by an Iowa recognized electrical contractor or an Iowa licensed Class A or Class B Master Electrician. This licensing requirement does not apply to the installation of class two or class three remote control circuits, signaling circuits, power limited circuits, optical fiber cables, other cabling or communications circuits, including raceways, as defined by NFPA 70 for voice, video, audio and data circuits. Refer to Iowa Code Section 103.

1.06 REGULATORY REQUIREMENTS

- A. Electrical installation to conform to requirements of NFPA 70.
- B. Products must be listed and classified by Underwriters Laboratories, Inc. (UL) or ETL as suitable for the purpose specified and indicated.
- C. All electrical work must be inspected in accordance with Iowa law. The inspection must be conducted by a state licensed inspector or the inspector of a political subdivision that Iowa State law recognizes as allowed to conduct inspections inside that subdivision. This inspection requirement does not apply to the installation of class two or class three remote control circuits, signaling circuits, power limited circuits, optical fiber cables, other cabling or communications circuits, including raceways, as defined by NFPA 70 for voice, video, audio and data circuits. Refer to Iowa Code Section 103.

1.07 WARRANTY

- A. Warranty must be one-year parts and labor unless noted otherwise for specific components. Warranty starts when the FMS Tier #1 software is operating; all required graphics are installed, fully active and displaying the input and output points, access to the internet is established, the Tier #2 hardware is operating, the Tier #3 hardware is operating, the Tier #2 and Tier #3 databases are stored on the Tier #1 mass storage device and the owner has taken beneficial occupancy of the building.
- B. All warranty service must be conducted by a technician employed by the FMS contractor except that problems specific to installation by a subcontractor may be resolved by that subcontractor.

1.08 MAINTENANCE SERVICE

- A. No regular maintenance of the control system is required after the warranty starts.
- B. Submit a written report to the owner after any warranty call. The report must state the reason for the warranty call, the FMS contractor's technicians diagnosis and any hardware or software repair or replacement required.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Instruments and control devices specified below may be made by the FMS manufacturer or may be third party OEM equipment cataloged by the FMS manufacturer that meets the specification requirements. All third party OEM devices must be warranted the same as devices manufactured by the approved FMS manufacturers and those warranties; both labor and material, must be executed by the FMS contractor.
1. Johnson Controls, Inc.
 2. Siemens Industries
 3. Trane Company
 4. Schneider Electric
 5. Honeywell
 6. Distech
 7. Automated Logic
 8. Minco
 9. BAPI
 10. Dwyer
 11. Veris
 12. ACI
 13. Belimo Air Control
 14. Apollo
 15. Bray
 16. Fisher
 17. Tyco/Keystone
 18. Griswold
 19. Danfoss
 20. Flow Control Industries
 21. Ruskin
 22. Tamco
 23. Honeywell Analytics
 24. MSA
 25. Setra
 26. Rosemont
 27. Endress + Hauser
 28. Gerand Engineering
 29. Onicon
 30. Badger
 31. Ebtron
 32. Air Monitor
 33. Engineer approved equal.
- B. This is a list of allowed manufacturers of end devices, both input (i.e. sensors) and output (i.e. actuators, valves, dampers). Inclusion of this list does not allow that manufacturer to bid the FMS System as the FMS contractor. The qualifications of the FMS contractor are established in Specification Section 23 0923 - Direct Digital Control Systems for HVAC.

2.02 CONTROL VALVES

- A. Ball Pattern:
1. Up to 2 Inches: Brass or bronze body, NPT female connections. The valve trim must include a stainless steel ball and stem.
 2. Modulated Valves: The valve manufacturer recommended maximum pressure drop for modulation service must be greater than the pump shut off head. Ball valves must not be used for steam service.
 3. Over 2 Inches: Brass, bronze or iron body, ANSI Class 125# flanges. The valve trim must include a stainless steel ball and stem. The valve manufacturer recommended maximum

pressure drop for modulation service must be greater than the pump shut off head for modulated valves. Ball valves must not be used for steam service.

4. Hydronic Systems:
 - a. Valve assembly, including packing, must be capable of continuous service at pressure of 125 psig and medium temperature of 250 deg F.
 - b. Size for between 4 and 6 PSIG maximum pressure drop at design flow for modulating service. Size equal to line size and use full port design for two-position service.
 - c. Two-way valves must have equal percentage characteristic, three-way valves linear characteristic. Two-way valve and actuator must be rated to close off against the pump shut off head. Three-way valve and actuator installed upstream of a pump must be rated to close off either inlet port against the shut off head of the more upstream pump supplying that pump, the 3-way valve is a mixing valve for a coil, it must be rated to close off a 10 psig pressure difference across a closed port.
- B. Operators:
 1. All modulating valve actuators must be electronic, using a 0-10 Vdc or 4-20 mA positioning input.
 2. All two-position valve actuators must be electric.
 3. Valve actuators on standard or pressure independent valves serving outside air preheating coils; heating coils at air handlers, fan coils or unit ventilators with outside air dampers; cooling coils at air handlers, fan coils or unit ventilators with outside air dampers and no heating coil upstream of the cooling coil; unit heaters in vestibules to outside; unit heaters within five feet (5') of an outside door or steam to hot water convertor supplied with up to 15 PSIG steam at the valve inlet must spring return to open on loss of power. Valve actuators on valves serving steam to hot water converter supplied with higher than 15 PSIG steam at the valve inlet and heat pump isolation valves must spring return to closed on loss of power.
 4. All fail in place valve actuators on standard and pressure independent valves must have a manual means for an operator to position the valve.
 5. All valve actuators must be capable of continuous service at the medium temperature expected for the valve. The actuator may be placed in a factory approved position that is not below the horizontal plane of the valve body and/or equipped with factory approved insulation and heat shields in order to meet this requirement.

2.03 INPUT/OUTPUT SENSORS FOR DDC CONTROL

- A. Temperature Sensors and Transmitters:
 1. Temperature sensors used for measuring room temperature and mounted on a wall or ceiling or installed in a return duct must have a +/- 0.5 F accuracy over a range of 55F to 95F. The sensor accuracy requirement applies to sensors that are connected to a Tier 2 or Tier 3 controller or sensors that are part of a thermostat. Room temperature sensors may be thermistor or RTD.
 2. Temperature sensors used to measure the discharge air temperature from an air valve, unit heater, fan coil unit, unit ventilator or duct mounted reheat coil must have a +/- 0.75F accuracy over a range of 20F to 120F. These temperature sensors may be thermistor or RTD. A duct mounted temperature sensor assembly must include a gasket to prevent air leakage. The temperature sensor may connect directly to a Tier 2 or Tier 3 controller or may connect to a temperature transmitter that in turn connects to a Tier 2 or Tier 3 controller.
 3. FMS contractor furnished or provided temperature sensors used for duct, air processing machine, immersion or outside air measurement other than to measure an air valve, unit heater, fan coil unit, unit ventilator or duct mounted reheat coil discharge temperature, may use a thermistor or RTD. Single point sensors must have an accuracy of +/- 0.36F or better in the range of 20F to 120F. Averaging sensors must have an accuracy of +/- 0.5F or better in the range of 20F to 120F.
 - a. An air processing machine is a packaged air handler, modular air handler, field built air handler, energy recovery ventilator, standalone preheat coil assembly or stand alone fan.

- b. Duct or air processing machine temperature sensors include single point or averaging element sensors listed on the point list in the sequence of operation or on the control system drawings that are used to sense discharge air temperature from an air processing machine, discharge temperature from any coil inside an air processing machine, entering air temperature into any coil inside an air processing machine, mixed air temperature associated with an air processing machine or air temperature entering an air processing machine.
 - c. Use single point temperature sensors in ducts or air processing machine locations that are 10 square feet or smaller and not used to measure mixed air temperature.
 - d. Use averaging elements for locations required in a point list or that are larger than 10 square feet or used to measure mixed air temperature, regardless of duct area. Use averaging elements that are at least 24 inches long at locations with up to 5 square feet of cross sectional area. Use averaging elements that are at least 48 inches long at locations with between 5 and 10 square feet of cross sectional area. Use averaging elements with a length of at least 96 inches long at locations with between 10 and 15 square feet of cross sectional area. Use averaging elements with a length of at least 96 inches long plus additional 12 inch increments for each square foot increment of cross sectional area above 15 square feet (i.e., a cross sectional area of 16 square feet requires a 108 inch long element. A cross sectional area of 20 square feet requires a 154 inch long element.). Multiple averaging bulb sensors may be used at a particular location to meet the bulb length requirement. Averaging sensors that are up to 48-inches long may be rigid or bendable. Averaging sensors longer than 48-inches long must be bendable.
 - e. Single point and averaging temperature sensor assemblies must include a junction box with a gasket to prevent leakage and reduce vibration noise.
 - f. Temperature sensors used for outside air temperature measurement be in a NEMA 4 watertight fitting or enclosure and shielded from the direct rays of the sun at all times.
 - g. Temperature sensors used for fluid temperature measurement must be inserted into a separable immersion well. The well must be constructed of brass or stainless steel.
4. FMS contractor furnished or provided temperature sensors used to measure liquid temperature must use a wire wound platinum RTD that meets EN60751 DIN Class A.
- a. The sensor must be inserted into a separable immersion well. The well must be constructed of brass or stainless steel.
 - b. The EN60751, Class A compliant temperature sensors must use 2-wire 4-20 mA transmitters to send the temperature information to the Tier 2 or Tier 3 controllers. The transmitter must have a measurement accuracy of equal to or less than $\pm 0.2\text{F}$. The transmitter must have a long term stability of less than or equal to 0.05% of full scale per year.
 - 1) The transmitter must be placed in close proximity to the sensor so the sensor lead length is not longer than 36 inches. The transmitter may be placed in an enclosure that is attached to the RTD sensor unless the transmitter's manufacturer recommends or requires remote mounting due to the process temperature. Special attention must be given to heated water temperature assemblies to insure that the transmitters remain within the manufacturer's ambient temperature requirements. The control design must assume that heated water will present at the upper end of the span (220F).
 - 2) Immersion temperature assemblies for chilled water must span 32F to 68F.
 - 3) Immersion temperature assemblies for condenser water must span 50F to 110F.
 - 4) Immersion temperature assemblies for heat pump loop systems must span 20F to 120F.
 - 5) Immersion temperature assemblies for heated water must span 70F to 220F.
- B. Relative Humidity Sensors:
1. The room and duct mounted relative humidity sensors must have a detection range of 0 - 100% relative humidity (RH) with linear output and be accurate within 3% full range, unless another accuracy is indicated on the points list.

2. The outside air relative humidity sensors must have a detection range of 0 - 100% relative humidity (RH) with linear output and be accurate within 2% full range.
 3. Place outside air sensors in a watertight inlet fitting, shielded from direct rays of sun.
- C. Equipment Operation Sensors:
1. Sense fan on/off status with adjustable threshold current sensors sized for the fan motors full load current draw on one horse power and larger motors. Use on/off current sensors for smaller motors.
 2. Sense pump on/off status with on/off current sensors.
 3. Sense the run status of any other electric motor with adjustable threshold current sensors sized for the motors full load current draw on one horse power and larger motors. Use on / off current sensors for smaller motors.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify that systems are ready to receive work.
- B. Beginning of installation means installer accepts existing conditions.
- C. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.
- D. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.
- E. Ensure installation components are complementary to installation of similar components.
- F. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.
- G. Do not install control instruments, including controllers, until building environment can be maintained within the operating conditions required by the manufacturer.
- H. Verify that field measurements are as indicated on shop drawings and instructed by manufacturer.

3.02 INSTALLATION

- A. Install all devices in accordance with manufacturer's instructions.
- B. Check and verify location of thermostats and other exposed control sensors with plans and room details before installation. Align with lighting switches.
- C. Mount long bulb duct thermostats and temperature sensors using flanges and element holders.
- D. Provide separable wells for liquids and flanges for air bulb elements.
- E. Mount all outside sensor's transmitters indoors and place the outside located elements under a sun shield.
- F. Automatic dampers must have parallel blades. When two dampers mix air, such as an outside and a return damper combination, install dampers so the air streams butt each other as the dampers open.
- G. Install damper motors on the outside of the duct in a warm location for outside air dampers. Extend damper shaft, including jack shafts, to the outside of the duct. The actuators for return dampers may be installed inside the duct. The actuators for exhaust and relief dampers may be mounted inside the duct if placed on the air entering side of the damper. Any actuator placed inside the duct must be accessible for replacement through a hinged access door. If any damper actuator must be installed outside in the weather, it must be in a NEMA 2, 3R or 4 (or IEC equivalent) enclosure and must have a heating element in the enclosure. The actuator must be able to provide full torque as the outside air temperature varies from -20F to 110F. If any damper actuator must be installed inside roof mounted HVAC equipment, that actuator must be cooled and / or heated as needed so that the motor provides full torque as the outside air temperature varies from -20F to 110F. Damper actuators may be stacked as long as done so in accordance with the manufacturer's instructions for stacking actuators.

- H. Mount control panels adjacent to associated equipment on vibration free walls or free standing angle iron supports. One cabinet may accommodate more than one system in same equipment room.
- I. Provide engraved plastic nameplates, attached with rivets or screws, for instruments and controls inside cabinet and on the cabinet face. Each controller must have a label that matches the designation used on the shop drawings. Each cabinet must have a label that matches the designation on the shop drawings. Each controller must have a label that describes the distribution panel board and circuit breaker that supplies its power. Each group of transformers must have a label that describes the distribution panel board and circuit breaker that supplies the group's power. If all components inside a cabinet are powered from the same circuit breaker, place the power source label on the front of the cabinet.
- J. Provide raceway, electrical wiring and wiring devices.
- K. Provide a dedicated 120 Vac, 20 amp circuit for the Tier #1 PC workstation and server (if required) and each Tier #2 controller. Tier #3 controllers that require 120 vac must be powered from the same circuit as the associated Tier #2 controller or a dedicated 20 amp circuit for Tier #3 controllers. The transformers for Tier #3 controllers that require 24 vac must be powered from the same circuit as the associated Tier #2 controller or a dedicated 20 amp circuit for Tier #3 controllers. The associated sensors and actuators of each Tier #2 and Tier #3 controller must be powered from the same circuit as the controller. If sensors and actuators must be electrically isolated from each other or their controllers, use 1:1 isolation transformers so that the same power circuit requirement is met. The FMS components, including sensors and actuators, must not share power circuits with anything else.
- L. Low voltage wiring must be run in raceway in exposed locations and non-accessible ceiling and wall areas. In concealed but accessible locations, control wiring must be in cable tray where available. Where cable tray is not available, low voltage control wiring must be neatly routed parallel and perpendicular to the building lines above accessible ceilings and grouped using D-rings. Use type CL2P (plenum) cable for all wiring and cables not in enclosed raceway. No raceway may be installed in view of occupants except in mechanical and electrical utility rooms.
- M. When installing a current sensor on any motor that is controlled by a VFD, place the current sensor on the power entering side of the VFD. Provide a separate junction box up-stream of the VFD to house the CT.
- N. Provide conduit and electrical wiring. Refer to electrical specification for conduit requirements. All conduits for control system wiring and cabling must match the color required in the electrical Specification Section 26 0553 Identification for Electrical Systems.

END OF SECTION 23 0913

SECTION 23 0923
DDC SYSTEM WITH WEB SERVER FOR HVAC SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tier #1 / #2 local area network
- B. Tier #3 local area network
- C. FMS access from outside the building locations
- D. Tier #2 stand-alone controllers
- E. Tier #2 controllers firmware and software
- F. Tier #3 programmable and application specific controllers

1.02 RELATED SECTIONS

- A. Specification Section 23 0913 - DDC Instruments and Control Devices for HVAC
- B. Specification Section 23 0993 - Sequence of Operation for HVAC Controls

1.03 REFERENCES

- A. ASHRAE 85 - Automatic Control Terminology for Heating, Ventilating, Air Conditioning
- B. ASME MC85.1 - Terminology for Automatic Control
- C. NEMA EMC1 - Energy Management Systems Definitions
- D. NFPA 70 - National Electrical Code
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 volts max)
- F. UL 508C - Standard for Safety Power Conversion Equipment
- G. UL 864 - Control Units and Accessories for Fire Alarm Systems

1.04 SYSTEM DESCRIPTION

- A. The automatic Facility Management System (FMS) in the customers building is arranged in three functional tiers.
 - 1. Tier #1 level is the information gathering level optimized for operator access. This level is not required for operation of the automation system but does contain the connection to the Internet required for this project.
 - 2. Tier #2 level is the major system or major area controllers. These controllers may control major systems such as energy plants and complex air handlers. These controllers perform advanced functions such as real time clocks, time of day schedules, trend storage, demand limiting, optimum start, chiller plant optimization, etc. These controllers may oversee a multitude of Tier #3 controllers serving a building or a major subdivision of a building. These controllers communicate peer to peer and do not depend on any Tier #1 device for operation and global coordination with other Tier #2 controllers.
 - 3. Tier #3 level is the individual system controllers. These are either application specific controllers or field programmable controllers intended to control a single system such as an air handler or terminal box. These controllers usually depend on the Tier #2 controllers for advanced functions, time clock and global coordination. These controllers are capable of operation independent of the Tier #2 and Tier #3 controllers but may lose advanced functions and global coordination.
- B. The FMS is a Heating, Ventilation and Air Conditioning (HVAC) monitoring and control system using both field programmable microprocessor based units and application specific microprocessor based units. This specification refers to the web server, located at Tier #1, the stand-alone controllers located at Tier #2 and the field programmable and application specific microprocessor based units located at Tier #3.
- C. The Tier #1, Tier #2 and Tier #3 FMS described in this specification must be complete and operable and must include all hardware, wiring, installation, software and licenses required to meet this specifications intent, even if not specifically required or mentioned in this specification.

- D. The three tier levels are functional. The physical configuration of the FMS may flatten to one or two levels. Tier 1 must be Ethernet TCP/IP. The Tier 2 controllers may communicate with each other over the same Ethernet TCP/IP network that Tier 1 uses. The Tier 3 controllers may communicate connect to a Tier 2 device using a RS-485 local area network or use the same Ethernet TCP/IP network that the Tier 1 and Tier 2 controllers use. Thermostats may use the same Ethernet TCP/IP network that the Tier 1 and Tier 2 controllers use.

1.05 DEFINITIONS

- A. Ensure terminology used in submittals conforms to ASHRAE 85.

1.06 SUBMITTALS

- A. See Specification Section 23 0913 DDC Instruments and Control Devices for HVAC.

1.07 PROJECT RECORD DOCUMENTS

- A. See Specification Section 23 0913 DDC Instruments and Control Devices for HVAC.

1.08 OPERATION AND MAINTENANCE DATA

- A. Include interconnection wiring diagrams complete field installed system with identified and numbered, system components and devices.
- B. Include keyboard illustrations and step-by-step procedures indexed for each operator function at an operator interface when using the graphical user interface.
- C. Include inspection period, cleaning methods, cleaning materials recommended and calibration tolerances.

1.09 QUALIFICATIONS

- A. The FMS contractor must maintain a field technician force of at least five technicians. Each technician must have at least one year experience programming and otherwise servicing the FMS contractor's model line of controls installed under this contract. The technician must be home based within a 150 mile radius of the project site, must be an employee of the FMS contractor, must be currently employed as a technician whom spends a majority of work hours on customer job sites, must have an individual specific vehicle tagged for use to respond to customer sites and an individual specific service tool capable of accessing the Tier #2 and Tier #3 controllers.
- B. The installer must be a company specializing in applying the work of this section with a minimum of five years experience. The installer may be a subcontractor with the minimum five years experience with their work overseen and directed by the FMS contractor.
- C. Any electrician installing electrical circuits must be licensed in the State of Iowa as a Class A or Class B Master Electrician or must be licensed in Iowa as a Class A or Class B Journeyman Electrician and be employed either by a Iowa recognized electrical contractor or a Iowa licensed Class A or Class B Master Electrician. This licensing requirement does not apply to the installation of Class 2 or Class 3 remote control circuits, signaling circuits, power limited circuits, optical fiber cables, other cabling or communications circuits, including raceways, as defined by NFPA 70 for voice, video, audio and data circuits. Refer to Iowa Code Section 103.

1.10 REGULATORY REQUIREMENTS

- A. Electrical installation to conform to requirements of NFPA 70.
- B. Products must be listed and classified by Underwriters Laboratories, Inc. (UL) or ETL as suitable for the purpose specified and indicated. If the FMS system is controlling an engineered smoke control system, the Tier #2 and Tier #3 controllers and any Ethernet switches routing smoke control commands and feedback must be listed as UL 864 devices.
- C. All electrical work must be inspected in accordance with Iowa law. The inspection must be conducted by a state licensed inspector or the inspector of a political subdivision that Iowa law recognizes as allowed to conduct inspections inside that subdivision. This inspection requirement does not apply to the installation of Class 2 or Class 3 remote control circuits, signaling circuits, power limited circuits, optical fiber cables, other cabling or communications

circuits, including raceways, as defined by NFPA 70 for voice, video, audio and data circuits.
Refer to Iowa Code Section 103.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. All computers, controllers and other hardware such as sensors and transmitters must be new and arrive at the job site in manufacturer's original packing. Inspect for damage and replace any damaged hardware immediately with new.
- B. Store in a clean, dry indoor space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to components, enclosure, and finish.

1.12 COORDINATION

- A. Ensure installation of components is complementary to installation of similar components in other systems.
- B. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.
- C. Ensure system is completed and commissioned.

1.13 WARRANTY

- A. See Specification Section 23 0913 DDC Instruments and Control Devices for HVAC Part 1.07 for warranty start and duration.
- B. All warranty service must be conducted by a technician employed by the FMS contractor except that problems specific to installation by a subcontractor may be resolved by that subcontractor.

1.14 MAINTENANCE SERVICE

- A. No regular maintenance of the control system is required after the warranty starts.
- B. Submit a written report to the owner after any warranty call. The report must state the reason for the warranty call, the FMS contractor's technicians diagnosis and any hardware or software repair or replacement required.

1.15 SCOPE

- A. All control systems must be full DDC with electronic actuation.

PART 2 PRODUCTS

2.01 MANUFACTURERS AND PRODUCT LINES

- A. Johnson Controls (Metasys) at 11318 Aurora Ave., Urbandale, IA and 1351 60th St., NE, Cedar Rapids, IA.

2.02 GENERAL PRODUCT DESCRIPTION

- A. The FMS must be capable of integrating multiple building functions including equipment supervision and control, alarm management, energy management, historical data collection and archiving.
- B. The FMS must consist of the following:
 - 1. Stand alone programmable DDC controllers at the Tier #3 level. These controllers may depend on a Tier #2 controller to implement advanced control strategies and global coordination.
 - 2. Stand alone application specific DDC controllers (ASC's) at the Tier #3 level. These controllers may depend on a Tier #2 controller to implement advanced control strategies and global coordination.
 - 3. Stand alone programmable DDC controllers at the Tier #2 level. These controllers communicate peer to peer with other Tier #2 controllers and must not depend on any Tier #1 controller to communicate or pass information to and from other Tier #2 controllers. The Tier #2 controllers are capable of implementing advanced control strategies and global coordination without the presence of any Tier #1 controller or device.

4. An interconnection to the Internet using a web server at the Tier #1 level. The web server connects the FMS to the customers Ethernet TCP/IP data network.
 5. A single communications network installed by the FMS contractor that connects to all Tier #2 controllers and Tier #1 devices. The Tier #1 / #2 network must be separate from any other network in the building.
 6. The Tier #3 communications networks, if separate from the Tier #1/#2, installed by the FMS contractor.
 7. The system must be modular in nature and must permit expansion of both capacity and functionality through the addition of sensors, actuators, Tier #2 controllers and Tier #3 controllers.
- C. Each Tier #2 controller must operate independently by performing its own specified control program, alarm management, operator I/O and historical data collection. The failure of any single component or network connection at the Tier #2 level must not interrupt the execution of control strategies at other Tier #2 controllers. The Tier #2 controllers must communicate peer to peer and not require the presence of Tier #1 controllers, servers or work stations to enable this communication.
- D. Tier #2 controllers must be able to access any data from or send control commands and alarm reports directly to any other Tier #2 controller or combination of controllers on the network without dependence upon a central processing device. Any Tier #2 controller must be able to send alarm reports to multiple operator interfaces without dependence upon a central processing device.
- E. Each Tier #3 level controller must operate independently by performing its' own specified control program. The failure of any single component or network connection at the Tier #3 level must not interrupt the execution of control strategies at other Tier #3 controllers. Any global input points used by Tier #3 controllers must remain at last known value upon loss of communications with the Tier #2 controller.

2.03 TIER #1 / #2 LOCAL AREA NETWORK

- A. The design of the FMS must connect the web server and Tier #2 controllers on a stand-alone, FMS specific Ethernet TCP/IP Tier #2 local area network. Inherent in the system's design must be the ability to expand or modify the network. This network is independent of any other networks in the building.
- B. This project does not use the FMS to control an engineered smoke control system so the switches and routers do not need to be UL listed for a life safety network and do not require a supervised power supply.
- C. The network must include provisions for automatically reconfiguring itself to allow all still operational equipment to perform their designated functions as effectively as possible in the event of single or multiple failures of servers, web servers, Tier #2 controllers or the network.
- D. The Tier #1 devices and Tier #2 controllers must communicate peer to peer on this local area network.
- E. The time clocks in all Tier #2 controllers must synchronize over the network.
- F. Alarm and data file transfers must not interfere with the Tier #2 local area network activity.
- G. The network must be cabled using CAT 6 with a dark green jacket. The FMS contractor must provide all routers, switches, repeaters and power supplies necessary to operate this FMS dedicated network.

2.04 TIER #3 LOCAL AREA NETWORKS

- A. The design of the FMS must connect all of the Tier #3 controllers associated with a Tier #2 controller onto a stand-alone, FMS specific Tier #3 local area network. Inherent in the system's design must be the ability to expand or modify the network.
- B. The network may consist of multiple segments originating at the Tier #2 controller. Each segment must install as a daisy chain, stringing the Tier #3 controllers together linearly. No star or tee taps are allowed.

- C. The Tier #3 networks' cables must have a dark green jacket, similar in shade to the Tier #1/#2 cable jacket color.
- D. Any or all of the Tier #3 controllers may connect to the Tier #1 / #2 network

2.05 FMS ACCESS FROM OUTSIDE THE BUILDING LOCATIONS

- A. Any computer or cell phone running a web browser connected to the building's internal information technology Ethernet or to the internet and the building's internal Ethernet is connected to the internet and presenting the correct password, must have the ability to access all graphics, trends, reports, alarms, point status, command points, acknowledge alarms and modify programs in any Tier #2 controller. The number of computers simultaneously accessing the FMS system may be limited by the number of user licenses owned by the building owner. The FMS contractor must provide at least one license for this project. The licenses must reside on the web server so that the connected device does not need to have any hardware or software installed to allow it access.
- B. Communications must be provided to allow the Tier #2 controllers to send alarms to remote operator devices via the Internet.
 - 1. The Tier #2 controllers must automatically send email messages to off-site computers and web enabled cell phones and personal data assistants to report critical alarms.
 - 2. The Tier #2 controllers must analyze and prioritize all alarms to minimize the initiation of calls to the remote operator stations.
- C. The fact that communications is taking place over the Internet must be completely transparent to the remote operator. A remote operator must be able to access this building by selection of its logical name.
- D. The web server must store the interactive graphics created for the requirements in Specification section 23 0993. The graphics must be available to any user with appropriate password accessing the web server. The graphics must dynamically update their information at least every 5 seconds. The user with appropriate password must be able to command the digital, multi-stage and analog points that are on the graphic. Create a home graphic showing the outline of the building with links to all of the subgraphics.
- E. The web server must allow the user to view the simultaneous trend at least two dynamic values and at least four stored values.

2.06 TIER #2 STAND-ALONE CONTROLLERS

- A. Tier #2 controllers must be microprocessor based, multi-tasking, multi-user, real-time digital control processors. Each Tier #2 controller must consist of modular hardware with enclosed processors, communication controllers, power supplies and input/output modules (as needed). A sufficient number of controllers must be supplied to fully meet the requirements of this specification.
- B. Each Tier #2 controller must allow operator access through the controller's serial interface. The operator must be presented with information through English language prompting and English language point identification.
- C. Point identification, engineering units, status indication, and applicable naming conventions must be the same at all Tier #2 controllers and remotely connected computers.
- D. Multiple-level password access protection must be provided to allow the user / manager to limit display and data base manipulation capabilities as that manager deems appropriate for each user, based upon an assigned password.
- E. Passwords must be exactly the same for all operator devices, including panel-mounted network terminals. Any additions or changes made to pass work definition must automatically cause passwords at all Tier #2 and Tier #3 controllers on a network to be updated and downloaded to minimize the task of maintaining system security. Users must not be required to update passwords for controllers individually.
- F. A minimum of 5 levels of access must be supported:
 - 1. Level 1 = Data Access and Display

2. Level 2 = Level 1 + Operator Over Rides
 3. Level 3 = Level 2 + Point Add/Delete/Modify
 4. Level 4 = Level 3 + Program Add/Delete/Modify
 5. Level 5 = Level 4 + Password Add/Delete/Modify
 6. A minimum of 10 passwords must be supported at each Tier #2 controller.
 7. Operators will be able to perform only those commands available for their respective passwords. Menu selections displayed at any operator device, including portable or panel mounted devices, and must be limited to only those items defined for the access level of the password used to log-on.
 8. User-definable, automatic log-off timers of from 1 to 60 minutes must be provided to prevent operators from inadvertently leaving devices on-line.
- G. Operator Commands: The operator interface must allow the operator to perform commands including, but not limited to the following:
1. Start up or shut down selected equipment.
 2. Adjust setpoints.
 3. Add/Modify/Delete time programming.
 4. Enable/Disable process execution.
 5. Lock/Unlock alarm reporting for each point.
 6. Enable/Disable total for each point.
 7. Enable/Disable trending for each point.
 8. Change PID loop set point.
 9. Enter temporary over ride schedules.
 10. Define holiday schedules.
 11. Change time/date.
- H. Each Tier #2 controller must have sufficient memory to support its own operating system and data bases including:
1. Control processes.
 2. Energy management applications.
 3. Alarm management.
 4. Historical/trend data for all points.
 5. Maintenance support applications.
 6. Custom processes.
 7. Operator I/O.
 8. Dial-up communications.
 9. Manual over ride monitoring.
- I. An operator must be able to use fill-in-the-blank templates and graphical programming or unstructured line programming similar to the BASIC programming language to create programs to control equipment.
1. In graphical programming, control sequences are created by using an input device to draw interconnecting lines between symbols depicting inputs, operators (comparisons and mathematical calculations) and outputs of a control sequence.
 2. In line programming, control sequences are created by using lines of control code similar to the BASIC programming language. Control code that is not similar to BASIC language must not be used without engineer approval.
- J. The Tier #2 controllers are not required to directly support I/O points.
- K. If the Tier #2 controller directly supports I/O points, it must support the following:
1. Digital inputs for status/alarm contacts.
 2. Digital outputs for on/off equipment control. All digital outputs must have a hand /off /auto override located at the controller. The hand /off /auto override status must be accessible by an operator at any remote computer or Tier #2 controller.
 3. Analog inputs. The available analog inputs must include 0 to 10 Vdc.
 4. Analog Outputs. The available analog outputs must include 0 to 10 Vdc. All analog outputs must have an off/on/auto or gradual position/auto override switch located at the controller.

The override status must be accessible by an operator at any Tier #1 location or Tier #2 controller.

5. Pulse accumulator digital input for pulsed dry contact monitoring.
- L. Each Tier #2 controller must have at least one RS232 and one USB or two USB serial data communication port(s) for serial printers, laptop workstations, controller mounted operator terminals and portable operator terminals. The controller must allow temporary use of portable devices without interrupting the operation of permanently connected modems, printers and terminals.
- M. The Tier #2 architecture must be modular in nature and allow easy expansion by adding additional Tier #2 controllers to the Tier #2 local area network. The FMS must be able to support at least 20 Tier #2 controllers and expand by only needing to install the new controller and extend the Tier #2 local area network to it. If the Tier #2 controller directly supports I/O points, it must be able to support 100% more of each of the supported point types than installed in this contract by nothing more than installing the appropriate point type modules and connecting to the Tier #2 controller.
- N. In the event of the loss of normal power, there must be an orderly shutdown of all Tier #2 controllers to prevent the loss of database or operating system software. Battery backup must be provided to support the real time clock and all volatile memory for a minimum of 72 hours.
- O. Upon restoration of normal power the Tier #2 controller must automatically resume full operation without manual intervention.
- P. Should a Tier #2 controller memory be lost for any reason, the user must have the capability of reloading the Tier #2 controller via the local port or via Internet.

2.07 TIER #2 CONTROLLERS FIRMWARE AND SOFTWARE

- A. General:
 1. All necessary software to form a complete operating system as described in this specification must be provided.
 2. The software programs specified in this section must be provided as an integral part of the Tier #2 controller and must not be dependent upon any higher level computer for execution.
- B. Control Software Description:
 1. The DDC panels must have the ability to perform the following pre-tested control algorithms:
 - a. Two position control.
 - b. Proportional control.
 - c. Proportional plus integral control.
 - d. Proportional, integral plus derivative control.
 2. Upon the resumption of normal power, the DDC panel must analyze the status of all controlled equipment, compare it with normal occupancy scheduling and turn equipment on or off as necessary to resume normal operation.
- C. Tier #2 controllers must have the ability to perform any or all of the following energy management routines.
 1. Time of day scheduling.
 2. Calendar based scheduling.
 3. Holiday scheduling.
 4. Temporary schedule over rides.
 5. Optimal start.
 6. Optimal stop.
 7. Night setback control.
 8. Fan speed /CFM control.
 9. Heating / cooling interlock.
 10. Hot water reset.
 11. Chilled water reset.

12. Condenser water reset.
 13. Chiller sequencing.
- D. All programs must be executed automatically without the need for operator intervention, and must be flexible enough to allow user customization. Programs must be applied to building equipment as described in the sequence of control.
- E. Tier #2 controllers must be able to execute custom, job-specific processes defined by the user, to automatically perform calculations and special control routines.
- F. It must be possible to use any of the following process inputs and variables in a custom process:
1. Any system-measured point data or status.
 2. Any calculated data.
 3. Any results from other processes.
 4. User defined constants.
 5. Arithmetic functions (=, -, *, /, square root, Expo, etc.)
 6. Boolean logic operators (and, or, exclusive or, etc.)
 7. On-delay/off-delay/interval timers.
- G. Custom processes may be triggered based on any combination of the following:
1. Time interval.
 2. Time of day.
 3. Date.
 4. Other processes.
 5. Time programming.
 6. Events (e.g. point alarms).
- H. A single process must be able to incorporate measured or calculated data from any and all other Tier #2 and Tier #3 controllers.
- I. In addition a single process must be able to issue commands to points in any and all other Tier #2 and Tier #3 controllers.
- J. Processes must be able to generate operation messages and advisories to operator I/O devices. A process must be able to directly send a message to a specified device, buffer the information in a follow-up file or cause the execution of a dial-up or Internet connection to a remote device such as a computer or cell phone.
- K. The custom control programming feature must be able to be documented and that documentation stored in the Tier #2 controller. The documentation may via graphical flow charts or English language comment statements.
- L. Alarm management must be provided to monitor, buffer and direct alarm reports to operator devices and memory files. Each Tier #2 controller must perform distributed independent alarm analysis and filtering to minimize operator interruptions due to non-critical alarms, minimize network traffic and prevent alarms from being lost. At no time must the Tier #2 controller's ability to report alarms be affected by either operator activity at a remote computer or local I/O device or communications with other Tier #2 controllers.
- M. All alarm or point change reports must include the point's English language description and the time and date of occurrence.
- N. The user must be able to define the specific system reaction for each point. Alarms must be prioritized to minimize nuisance reporting and to speed operator response to critical alarms. A minimum of three priority levels must be provided.
- O. Users must have the ability to manually inhibit alarm reporting for each point. The user must also be able to define under which conditions point changes need to be acknowledged by an operator, and/or sent to follow-up files for retrieval and analysis at a later date.
- P. Alarm reports, messages, and files must be directed to a user-defined list of operator devices or used for archiving alarm information. Alarms must also be automatically directed to a default device in the event a primary device is found to be off-line.

- Q. Only alarms defined by the user as critical alarms may initiate a call to a remote operator device. In all other cases, call activity must be minimized by time-stamping and saving reports until an operator scheduled time, a manual request or until the buffer space is full.
- R. Data collection utilities must be provided to automatically sample, store and display system data. The operator manually selects points for trending. Each Tier #2 controller must have a dedicated buffer for trend data and must be capable of storing a minimum of 2500 total data samples and 200 samples for each defined point.
 - 1. Tier #2 controllers must store histories for all points defined for trending.
 - 2. The point trend must automatically sample the value of selected points by time interval or by change of value as selected by the operator.
- S. Tier #2 controllers must automatically accumulate and store run time hours for digital outputs and digital inputs defined by the operator. The operator manually selects points for run time accumulation.
- T. The run time totalizer must accumulate run time in minutes or hours as selected by the operator.
- U. Tier #2 controllers must automatically sample, calculate and store consumption totals on a daily, weekly, or monthly basis for user-selected analog and digital pulse input type points.
- V. Total must provide calculation and storage of accumulations of up to 99,999.9 units (e.g. KWH, gallons, KBTU, tons. etc.)

2.08 TIER #3 PROGRAMMABLE AND APPLICATION SPECIFIC CONTROLLERS

- A. Each Tier #2 controller must be able to extend its performance and capacity with remote Tier #3 controllers.
- B. The Tier #3 controllers are intended to control individual pieces of equipment such as air handlers (both built up and unitary), roof top units, terminal boxes, fan coil units, unit heaters, unit ventilators and heat pumps. Each of these types of units must be controlled from the Tier #3 controller that contains its control program. Multiple units may be controlled from the same Tier #3 controller so long as the controller has sufficient I/O capacity to support the required points.
- C. Tier #3 controllers must be microprocessor based, multi-tasking digital control processors. Each Tier #3 controller must consist of modular hardware with enclosed processors, communication controllers, power supplies and input/output points. Each controller may use canned programs resident on EEPROM (Application Specific Controllers), needing only setup parameters to be modified in the field, or custom programs resident on RAM (Programmable Controllers) which are loaded in the field. A sufficient number of controllers must be supplied to fully meet the requirements of this specification.
- D. Each Tier #3 controller must have sufficient memory to support its own operating system and data bases including:
 - 1. Control processes.
 - 2. Operator I/O.
- E. An operator must be able to use fill-in-the-blank templates and graphical programming or unstructured line programming similar to the BASIC programming language to create programs to control equipment in programmable controllers.
 - 1. In graphical programming, control sequences are created by using a mouse input device to draw interconnecting lines between symbols depicting inputs, operators (comparisons and mathematical calculations) and outputs of a control sequence.
 - 2. In line programming, control sequences are created by using lines of control code similar to the BASIC programming language. Control code that is not similar to BASIC language must not be used without engineer approval.
- F. The operator interface to a Tier #3 controller to view its data points or to a Tier #3 programmable controller to view its program must be through a remote device accessing

through the Tier #1 web server or through a portable terminal using an industry standard application connected to any Tier #2 controller or directly to the particular Tier #3 controller.

- G. In the event of the loss of normal power, there must be an orderly shutdown of all Tier #3 controllers to prevent the loss of database or operating system software. Battery backup must be provided to support all volatile memory for a minimum of 72 hours. If the point database, programs and any programmable parameters are stored in non-volatile memory and are instantly available without needing to download from a higher tier mass storage device when power is restored, no battery backup is required.
- H. Each Tier #3 controller must contain the point database and program necessary to execute the sequence of control for the equipment that it controls. The controller must not rely on any other controller, except for global points, to execute the sequence of control. Examples of global points are outside air temperature, time schedules in higher tier controllers that index the Tier #3 controller between occupied and unoccupied mode and water temperature supplied from the central energy plant. If the Tier #3 controller loses reception of some or all global points, it must continue to execute the sequence of control with last known values.
- I. The Tier #3 controller must support the following points:
 - 1. Digital inputs for status/alarm contacts.
 - 2. Digital outputs for on/off equipment control.
 - 3. Analog inputs.
 - 4. Analog Outputs: The analog output may be 0-10 Vdc or a pair of digital outputs working as a coordinated open/close pair to pulse width modulate a floating actuator or combinations of the two. If the analog output is a coordinated pair of digital outputs, the controller must utilize algorithms designed to smoothly and gradually open and close the actuator.
- J. Regardless of the sequence of control, all Tier #3 controllers must include an analog input point reserved for supply air temperature to be installed in the future if not required under this contract (or another temperature if the equipment is not an air moving device).

PART 3 EXECUTION

3.01 PREPARATION

- A. See Specification Section 23 0913 DDC Instruments and Control Devices for HVAC Part 3.01 for preparation requirements.

3.02 INSTALLATION

- A. See Specification Section 23 0913 DDC Instruments and Control Devices for HVAC Part 3.02 for installation requirements.

3.03 FMS MANUFACTURER'S FIELD SERVICES

- A. Provide a field technician meeting the requirements, except residency and vehicle, stated in Part 1 - Qualifications for Field Technicians to instruct up to four owner's representatives in the operation of the Tier #1 web server, Tier #2 controllers and Tier #3 controllers. This instruction must be at least 8 hours in length, conducted in no more than four hour long segments.
- B. Provide a field technician meeting the requirements, except residency and vehicle, stated in Part 1 - Qualifications for Field Technicians to instruct up to four owner's representatives in operating the web server's human interface features. This training must include navigation through graphics, creating user accounts, viewing and acknowledging alarms, viewing input and output points, commanding output points, creating and modifying time of day schedules, creating and modifying alarms including transmitting alarms to cell phones and Internet accessible off site computers and backing up and restoring data bases. The training needs to heavily emphasize creating and modifying time of day schedules, creating user accounts, viewing and acknowledging alarms and navigation through graphics. The other required topics may be covered more lightly and should only be covered after the users master the emphasized topics. This instruction must be at least 16 hours in length, conducted in no more than four hour long segments.

END OF SECTION 23 0923

SECTION 23 0993
SEQUENCE OF OPERATION FOR HVAC CONTROLS

PART 1 GENERAL

1.01 SCOPE

- A. Four Pipe Fan Coil Unit
- B. ERV-2

1.02 RELATED SECTIONS

- A. Specification Section 23 0913 - DDC Instruments and Control Devices for HVAC.
- B. Specification Section 23 0923 - DDC System with Web Server HVAC System.

1.03 GENERAL PROVISIONS

- A. The Facility Management System (FMS) contractor, general contractor, mechanical contractor, electrical contractor, low voltage systems contractor and all equipment suppliers must examine this sequence of operation and provide hardware, software, design services, technician services, programming services, computers, controllers, sensors, transmitters, switches, actuated devices, relays, contactors, automation dampers, electrical power, cabling, wiring, enclosures, raceways, installations and anything else required to implement the intent of the individual sequences of control embodied in this sequence of operation and result in fully functioning FMS systems. The FMS system includes all required interfaces and connections to equipment not furnished by the FMS contractor. Anything required to meet the intent of this sequence of operation, even if not specifically listed, must be furnished, installed or provided as required.
- B. The requirements stated in this sequence of operation take precedence over any control features or requirements stated in the specification document or in the drawing notes for any equipment that is touched by this sequence of operation.
- C. All points in the point lists must be provided. Additionally, any additional physical or virtual points that are required to execute the sequence of operation must also be provided as part of the base bid contract.
- D. All setpoints, alarm thresholds, timers, dead bands, time constants, sampling intervals, etc. stated in the sequence of operation are preliminary and must be modified by the FMS contractor during start up, formal commissioning and as required during the warranty period to insure a stable and comfortable building environment commensurate with proper operation of the equipment that preserves their manufacturers' warranties.

PART 2 SEQUENCE OF OPERATION

NOT USED

PART 3 EXECUTION

3.01 FOUR PIPE FAN COIL UNIT

- A. The FCU functions as a heating and cooling fan coil unit (FCU).
 - 1. The FCU has:
 - a. Constant speed supply fan
 - b. Chilled water cooling coil
 - c. Heated water heating coil
 - 2. The FCU must have a complete field installed control system that executes this section of the sequence of control.
- B. The FCU's controls must perform the important control functions that include the following:
 - 1. Room temperature control using the heating coil and cooling coil.
- C. The FCU manufacturer must include the following:
 - 1. A switch that closes a contact to indicate high water in the condensate drain pan.
- D. The FMS contractor must include the following:

1. Provide a wall mounted thermostat (TH-1) that includes the following:
 - a. Local set point adjustment.
 - b. Unoccupied override button.
 - c. Software limit the local set point adjustment range to between 68F and 75F (adj.).
 - d. Override button initiates occupied operation for a time duration adjustable up to at least four hours.
 2. Connect to high water alarm switch.
- E. FCU Protection Functions.
1. Hard Wired Safeties
 - a. Safeties must be hard wired and not depend on the operation of the FMS to work.
 - b. If the FCU design CFM is at or over 2,000 CFM and the building fire alarm activates, shut down the fan.
 2. Alarms. Alarms must appear and buffer at the alarm reporting locations until acknowledged.
 - a. If the supply fan does not indicate on (CS-1) if commanded on or indicates on if commanded off, annunciate an alarm.
 - b. If the room temperature is more than 4F above the setup temperature set point or more than 4F below the setback temperature set point, annunciate an alarm.
 - c. If the room temperature is below 45F (adj.), annunciate a critical alarm.
 - d. If the high condensate alarm activates, annunciate an alarm.
- F. Set Points
1. The ROOM COOLING TEMPERATURE SET POINT is 2F (adj.) above the thermostat's local set point.
 2. The ROOM HEATING TEMPERATURE SET POINT is 2F (adj.) below the thermostat's local set point.
 3. The SETBACK TEMPERATURE SET POINT is 62F (adj.).
 4. The SETUP TEMPERATURE SET POINT is 84F (adj.).
 5. The SUPPLY COOLING TEMPERATURE SET POINT is 55F (adj.).
 6. The SUPPLY HEATING TEMPERATURE SET POINT is 85F (adj.).
 7. The OVERRIDE TIME SET POINT is 2 hours (GRAPHIC).
- G. FCU On / Off Functions.
1. The FMS indexes the FCU between ON and OFF in response to a time-of-day schedule or an afterhours override because of a user's request or adverse room conditions.
 - a. If the time clock indicates occupied, index DAYRUN to ON.
 - b. If the time clock indicates unoccupied, index DAYRUN to OFF.
 - c. If a user presses the thermostat's override button, index USERRUN to ON.
 - d. If the thermostat's OVERRIDE TIME SET POINT expires, index USERRUN to OFF.
 - e. Evaluate the room temperature every 5 minutes (adj.).
 - f. If the room temperature is below its SETBACK TEMPERATURE SET POINT or is above its setup temperature set point, index NIGHTRUN to ON.
 - g. If the room temperature is above its SETBACK TEMPERATURE SET POINT and is below its SETUP TEMPERATURE SET POINT, index NIGHTRUN to OFF.
 2. FCU ON or OFF
 - a. If DAYRUN is ON or USERRUN is ON or NIGHTRUN is ON, index the FCU to ON.
 - b. If DAYRUN is OFF and USERRUN is OFF and NIGHTRUN is OFF, index the FCU to OFF.
 3. If FCU indexed OFF or FCU controller returns from power failure and indexed OFF:
 - a. The supply fan stops.
 - b. The cooling valve closes.
 - c. The heating valve closes.
 4. If FCU indexed ON or FCU controller returns from power failure and indexed ON:
 - a. The supply fan runs.
 - b. The cooling valve may modulate.
 - c. The heating valve may modulate.

- H. Occupied Room Temperature Control
 - 1. Evaluate the room temperature every 5 minutes (adj.).
 - 2. If the room temperature (TH-1) is above the ROOM COOLING TEMPERATURE SET POINT, index the FCU to COOL.
 - 3. If the room temperature is below the ROOM HEATING TEMPERATURE SET POINT, index the FCU to HEAT.
 - 4. If the room temperature is between the ROOM HEATING TEMPERATURE SET POINT and the ROOM COOLING TEMPERATURE SET POINT, index the FCU to RECIRC.
- I. FCU Supply Air Temperature Control.
 - 1. If COOL is on.
 - a. Modulate the cooling valve (V-1) to maintain the supply air temperature (TE-1) at the SUPPLY COOLING TEMPERATURE SET POINT.
 - b. Close the heating valve (V-2).
 - 2. If HEAT is on.
 - a. Close the cooling valve (V-1).
 - b. Modulate the heating valve (V-2) to maintain the supply air temperature (TE-1) at the SUPPLY HEATING TEMPERATURE SET POINT.
 - 3. If RECIRC is on.
 - a. Close the cooling valve (V-1).
 - b. Close the heating valve (V-2).
- J. Points List.
 - 1. All points listed below must appear on the FCU graphic.
 - 2. All points in the sequence labeled as (GRAPHIC) must appear on the FCU graphic.
 - 3. Analog Input (AI)
 - a. Room temperature (TH-1)
 - b. Room temperature set point (TH-1)
 - c. Supply air temperature (TE-1)
 - 4. Analog Output (AO)
 - a. Cooling valve (V-1)
 - b. Heating valve (V-2)
 - 5. Digital Input (DI)
 - a. High condensate alarm
 - b. Supply fan status (CS-1) (current sensor)
 - c. Occupied override (TH-1)
 - 6. Digital Output (DO)
 - a. FCU supply fan On / Off
 - 7. Linkage
 - a. Direct link from the FCU graphic to the sequence of operation section FOUR PIPE FAN COIL UNIT.
 - b. Direct link from the FCU graphic to the time-of-day schedule.

3.02 ERV-2

- A. The energy recovery ventilator (ERV) functions as a 100% outside air, 100% exhaust air energy exchange unit with supply air cooling and supply air heating.
 - 1. The ERV has:
 - a. Constant speed supply fan.
 - b. Constant speed exhaust fan.
 - c. Total energy resin bed outside air to exhaust air energy exchange.
 - d. Cooling coil.
 - e. Heating coil in preheat position and with a coil pump.
 - f. Electric preheat coil.
 - 2. The ERV must have a complete factory installed control system that executes this sequence of control.

- B. The ERV controls must perform the important control functions that include the following:
 - 1. Supply air temperature control using the heating and cooling coils. Provide a 3-way valve for each of the chilled water and heating water coils.
 - 2. Turn on the heated water coil pump based on outside air temperature.
 - 3. Preheat control with the electric coil.
 - 4. Furnish an outdoor air isolation damper. Provide a 2-position electric actuator for the outside air isolation damper. The actuator must include an end switch that closes if the damper is full open.
 - 5. Furnish an exhaust air isolation damper. Provide a 2-position electric actuator for the exhaust air isolation damper. The actuator must include an end switch that closes if the damper is full open.
 - 6. Supply fan control.
 - 7. Exhaust fan control.
- C. The FMS contractor must include the following:
 - 1. Furnish the chilled water 3-way valve. Connect the valve to the ERV control panel.
 - 2. Furnish the heated water 3-way valve. Connect the valve to the ERV control panel.
 - 3. Integrate to the ERV control system.
 - a. The integration protocol must be BACnet MS/TP.
 - b. The ERV control system must provide, and the FMS must process all points in the sequence listed as adjustable in addition to all points in the point list.
 - 4. Provide all hard-wired input and output points and required instruments, including those listed in this specification subsection.
- D. ERV Protection Functions
 - 1. Software Safeties
 - a. If the supply air temperature (TE-1) is below 30F (adj.) for more than 5 minutes (adj.):
 - 1) The supply fan stops.
 - 2) The exhaust fan stops.
 - 3) The outside air isolation damper (AE-1) and exhaust air isolation damper (AE-2) close.
 - 4) The cooling valve (V-1) and heating valve (V-2) open to the coils.
 - 5) The heated water coil pump runs.
 - 6) If an operator presses the supply air temperature safety's software reset on the GRAPHIC, the ERV resumes operation.
 - b. If the outdoor air isolation damper or exhaust air isolation damper indicates alarm on failure to open:
 - 1) Stop the ERV fans.
 - 2) If both the outside air isolation damper and exhaust air isolation damper indicate open, the fans return to FMS control.
 - 2. Alarms
 - a. If a fan does not indicate (CS) on if commanded on or indicates on if commanded off, annunciate an alarm.
 - b. If the supply air temperature (TE-1) is below 45F (adj.) for more than 5 minutes (adj.), annunciate an alarm.
 - c. If the supply air temperature (TE-1) is below 35F (adj.) for more than 5 minutes (adj.), annunciate a critical alarm.
 - d. If the heated water coil pump does not indicate on and the outside air temperature is below 35F (adj), annunciate a critical alarm.
 - e. If an isolation damper does not indicate (ES) open if commanded open or indicates open if commanded closed, annunciate an alarm.
- E. Set Points
 - 1. Supply temperature set point.
 - a. Determine the set point every 15 minutes.

- b. If the outside air temperature is at or above 65F (adj.), the supply temperature set point is 55F (adj.).
 - c. If the outside air temperature is at or below 10F (adj.), the supply temperature set point is 65F (adj.).
 - d. As the outside air temperature varies from 10F to 65F, the supply temperature set point varies linearly from 65F to 55F.
- F. On / Off Functions
1. The FMS time clock indexes the ERV and its associated terminal fan coil units between occupied and unoccupied in response to a time of day schedule or an afterhours override.
 - a. If the time of day schedule indicates the associated terminal fan coil units occupied, index the ERV to ON.
 - b. If a user presses an associated terminal fan coil unit's thermostat's override button, the FMS indexes the ERV to ON.
 - c. If the time of day schedule indicates the associated terminal fan coil units unoccupied and no thermostat is overridden, index the ERV to OFF.
 2. If the FMS indexes the ERV to OFF, or the ERV returns from a power failure and the ERV is commanded OFF:
 - a. The ERV fans stop.
 - b. The outside air isolation damper and exhaust air isolation damper close.
 3. If the FMS indexes the ERV to ON, or the ERV returns from a power failure and the ERV is commanded ON:
 - a. The outside air isolation damper and exhaust air isolation damper open.
 - b. The ERV fans run.
 - c. The cooling valve may modulate.
 - d. The heating valve may modulate.
 4. If the outside air temperature is below 40F (adj):
 - a. The heated water coil pump runs.
 - b. The heating valve modulates to 10% (adj) open.
 - c. The cooling valve modulates to 10% (adj) open.
- G. Supply Air Conditions Control
1. Modulate the heating valve (V-2) and the cooling valve (V-1) to maintain the supply air temperature.
- H. Points List
1. All points listed below must appear on the ERV and FCU graphic.
 2. All points in the sequence labeled as (GRAPHIC) must appear on the ERV and FCU graphic.
 3. Analog Input (AI)
 - a. Coils supply air temperature (TE-1)
 - b. ERV supply air temperature (TE-2)
 - c. Outside air temperature (global)
 4. Analog Output (AO)
 - a. Chilled water valve (V-1)
 - b. Heated water valve (V-2)
 5. Digital Input (DI)
 - a. ERV supply fan status (current sensor) (CS-1)
 - b. ERV exhaust fan status (current sensor) (CS-2)
 - c. Outside air isolation damper full open indication switch (ES-1)
 - d. Exhaust air isolation damper full open indication switch (ES-2)
 - e. Heated water coil pump status (current sensor) (CS-1)
 6. Digital Output (DO)
 - a. ERV fans On / Off
 - b. Outside air (AE-1) and exhaust air (AE-2) isolation dampers Open / Close
 - c. Heated water coil pump On / Off
 7. Linkage

- a. Direct link to the time of day schedule.
- b. Direct link from the dedicated graphic to the sequence of operation section ERV-1.

END OF SECTION 23 0993

SECTION 23 2113
HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Heating water piping
- B. Chilled water piping
- C. Equipment drains and overflows
- D. Unions, flanges, and couplings
- E. Ball valves
- F. Butterfly valves
- G. Spring loaded wafer check valves

1.02 RELATED SECTIONS

- A. Specification Section 23 0719 - HVAC Piping Insulation
- B. Specification Section 23 2500 - HVAC Water Treatment

1.03 REFERENCES

- A. ASME - Boiler and Pressure Vessel Codes, SEC 9 - Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Braising Operators
- B. ASME B16.3 - Malleable Iron Threaded Fittings Class 50 and 300
- C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings
- D. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
- E. ASME B31.9 - Building Services Piping
- F. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless
- G. ASTM A234 - Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures
- H. ASTM B32 - Solder Metal
- I. ASTM B88 - Seamless Copper Water Tube
- J. ASTM F708 - Design and Installation of Rigid Pipe Hangers
- K. AWS A5.8 - Brazing Filler Metal
- L. AWS D1.1 - Structural Welding Code

1.04 SUBMITTALS

- A. Product Data: Include data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- B. Provide schedule of all system types and piping and fitting types provided, clearly indicating which submitted piping and fittings are associated to each system on the project. Schedule shall be at the beginning of piping submittal
- C. Welder's Certificate: Include Welder's Certification of Compliance with ASME Section IX.
- D. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

1.05 PROJECT RECORD DOCUMENTS

- A. Record actual locations of valves.

1.06 OPERATION AND MAINTENANCE DATA

- A. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- B. Installer: Company specializing in performing the work of this section with minimum three years experience.
- C. Welders: Certify in accordance with ASME Section IX.

1.08 REGULATORY REQUIREMENTS

- A. Conform to ASME B31.9 code for installation of piping system.
- B. Welding Materials and Procedures: Conform to ASME SEC 9 and applicable state labor regulations.
- C. Provide certificate of compliance from authority having jurisdiction indicating approval of welders.

1.09 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site.
- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on cast iron and steel valves.
- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work and isolating parts of completed system.
- F. Protect plastic piping materials from degradation due to ultraviolet (UV) light exposure. Where plastic piping materials are stored in a location that receives direct sunlight, provide protective coverings to shield materials UV light exposure.

PART 2 PRODUCTS

2.01 HEATING WATER PIPING (ABOVE GROUND)

- A. Steel Pipe: ASTM A53, SCH 40/STD WT. Grade B, Black.
 - 1. Fittings:
 - a. Threaded: ASTM A196, 150 PSI Malleable Iron
 - b. Weld: ASTM B16.3 Malleable Iron or ASTM A234 Forged Steel Welding Type
 - 2. Joints:
 - a. Two Inch (2") and Under: Threaded
 - b. Two Inch (2") and Over: Welded
- B. Copper Tubing: ASTM B88, type #L, hard drawn.
 - 1. Fittings: ASME B16.18 cast brass or ASME B16.22 solder wrought copper.
 - 2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.
 - 3. Joints: Solder, lead free, 95-5 tin antimony or tin and silver with melting range 430 deg F to 535 deg F.

2.02 CHILLED WATER PIPING (ABOVE GRADE)

- A. Steel Pipe: ASTM A53, SCH 40/STD WT. Grade B, Black.
 - 1. Fittings:
 - a. Threaded: ASTM A196, 150 PSI Malleable Iron
 - b. Weld: ASTM B16.3 Malleable Iron or ASTM A234 Forged Steel Welding Type
 - 2. Joints:
 - a. Two Inch (2") and Under: Threaded
 - b. Two Inch (2") and Over: Welded
- B. Copper Tubing: ASTM B88, type #L, hard drawn.
 - 1. Fittings: ASME B16.18, cast brass or ASME B16.22, solder wrought copper.
 - 2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.

3. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony or tin and silver with melting range 430 deg F to 535 deg F.

2.03 EQUIPMENT DRAINS AND OVERFLOWS

- A. Copper Tubing: ASTM B88, type #M, hard drawn.
 1. Fittings: ASME B16.18 cast brass.
 2. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony or tin and silver with melting range 430 deg F to 535 deg F.
- B. Steel Pipe: ASTM A53, Schedule 40, black. Minimum 0.375 inch wall for 12 inch and over.
 1. Fittings: ASTM B16.3, malleable iron.
 2. Joints: Threaded for pipe two inch (2") and under; AWS D1.1 welded for pipe over 2 inches.

2.04 UNIONS, FLANGES AND COUPLINGS

- A. Unions for Pipe Two Inch (2") and Under:
 1. Ferrous Piping: 150 psig malleable iron, threaded.
 2. Copper Pipe: Bronze, soldered joints.
- B. Flanges for Pipe Over Two Inches:
 1. Ferrous Piping: 150 psig forged steel, slip-on.
 2. Copper Piping: Bronze.
 3. Gaskets: 1/16 inch thick preformed neoprene.
- C. Dielectric Nipples:
 1. Required for all dissimilar metal pipe joints.
 2. Joints: Threaded, Flanged, or Grooved
 3. Fittings: Dielectric Nipple – Copper Silicone Casting conforming to UNS C87850. The fitting must have a minimum end to end length of:
 - a. 3 inches (1/2 to 3/4 inch IPS/CTS Pipe)
 - b. 4 inches (1 to 2 inch IPS/CT)
 - c. 6 inches (2-1/2 to 4 inch IPS/CTS Pipe)

2.05 BALL VALVES (2" AND SMALLER)

- A. Manufacturers:
 1. Apollo #77-140
 2. Watts #LFB6080G2-SS
 3. Nibco #T-585-70-66
 4. Milwaukee #BA-400S3
 5. Engineer approved equal.
- B. Bronze two piece full port body, chrome plated ball, RPTFE seats and thrust washer, lever handle threaded ends.

2.06 BUTTERFLY VALVES (OVER 2")

- A. Manufacturers:
 1. Nibco #LD-2000
 2. Apollo #LD141
 3. DeZurik #BOS-US
 4. Victaulic #761
 5. Engineer approved equal.
- B. Body: Ductile iron ASTM A 536, lugged, extended neck capable of providing bi-directional "Dead End Service" without the need for a downstream blind flange.
- C. Seat: Up to 12", Molded-in resilient EPDM seat, bonded to valve body. Over 12": Cartridge Seat.
- D. Disc: Aluminum Bronze or Bronze B-584 C84400 or stainless steel.
- E. Stem: Stainless steel 316 or 416.

- F. Valve size Up to 12": Pins fastening the disc to stem are expressly prohibited. Valve sizes over 12": Bolts fastening disc to stem are acceptable.
- G. Operator: Lever handle (10 position) with memory stop. All butterfly valves six inch (6") and larger shall have gear operated handles.

2.07 SPRING LIFT CHECK VALVES (UP TO 2 INCHES)

- A. Manufacturers:
 - 1. Crane #27TF
 - 2. Lukenheimer #233
 - 3. Engineer approved equal.
- B. Lift check style, bronze body, bronze or stainless steel trim, stainless steel spring, renewable seat and disc, Class 150, threaded ends.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- E. After completion fill, clean, and treat systems.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install heating water, glycol, chilled water piping to ASME B31.9.
- C. Route piping in orderly manner, parallel to building structure and maintain gradient.
- D. Install piping to conserve building space and not interfere with use of space.
- E. Group piping, whenever practical, at common elevations.
- F. Sleeve pipe passing through partitions, walls, and floors.
- G. Slope piping and arrange to drain at low points in open system.
- H. Install piping to allow for expansion and contraction without stressing pipe, joints or connected equipment.
- I. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- J. Provide access where valves and fittings are not accessible. Coordinate size and location of access doors.
- K. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- L. Where pipe support members are welded to structural building framing; scrape, brush clean, and apply one coat of zinc rich primer to welds.
- M. Prepare unfinished pipe, fittings, supports, and accessories for finish painting.
- N. Install valves with stems upright or horizontal. Not inverted.
- O. Wire welding is not permitted.
- P. Caulking or salting of joints is not permitted.
- Q. Condensate drain lines shall have four inch (4") high vent T's every 20 feet minimum or in each horizontal line when less than 20 feet. Provide cleanouts as required to service line.
- R. Where more than one piping system material is specified, ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide

necessary joining fittings. Ensure that flanges, union, and couplings for servicing are consistently provided.

- S. Use unions, flanges, and couplings downstream of valves and at equipment or apparatus connections. Do not use direct welded or threaded connections to valves, equipment or other apparatus.
- T. Use non-conducting dielectric connections whenever jointing dissimilar metals in open systems.
- U. Provide pipe hangers and supports in accordance with ASTM B31.9 unless indicated otherwise.
- V. Use ball or butterfly valves for shut-off and to isolate equipment, part of systems or vertical risers.
- W. Use 3/4 inch ball valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment. Pipe to nearest floor drain.

3.03 PIPE JOINT CONSTRUCTION

- A. Ream/remove burrs from plain ends of pipe. Prepare pipe with a beveled end prior to welding.
- B. Remove Scale, slag and debris from inside and outside of pipe and fittings prior to assembly.
- C. Soldered Joints: Construct joints according to ASTM B828. Apply ASTM B813 water-flushable flux, unless otherwise indicated. Install using lead-free solder complying with ASTM B32
- D. Threaded Joints: Thread Pipe with tapered pipe threads according to ASME B1.20.1. Ream Pipe ends to remove burrs and restore full ID. Apply appropriate tape or thread compound to external pipe threads
- E. Welded Joints: Construct joints according to AWS D10.12/D10.12M

END OF SECTION 23 2113

**SECTION 23 2123
HYDRONIC PUMPS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. In-line circulators

1.02 RELATED SECTIONS

- A. Specification Section 23 0719 - HVAC Piping Insulation
- B. Specification Section 23 2113 - Hydronic Piping

1.03 REFERENCES

- A. UL 778 - Motor Operated Water Pumps
- B. NFPA 70 - National Electrical Code

1.04 PERFORMANCE REQUIREMENTS

- A. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25% of midpoint of published maximum efficiency curve.

1.05 SUBMITTALS

- A. Product Data: Provide certified pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements.
- B. Manufacturer's Installation Instructions: Indicate hanging and support requirements and recommendations.
- C. Millwright's Certificate: Certify that base mounted pumps have been aligned.

1.06 OPERATION AND MAINTENANCE DATA

- A. Operation and Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacture, assembly and field performance of pumps with minimum three years experience.
- B. Alignment: Base mounted pumps shall be aligned by qualified millwright.

1.08 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 IN-LINE CIRCULATORS

- A. Manufacturers:
 - 1. B & G
 - 2. Taco
 - 3. Paco
 - 4. Armstrong Pumps, Inc.
 - 5. Patterson Pump
 - 6. Engineer approved equal.
- B. Type: Horizontal shaft, single stage, direct connected with resiliently mounted motor for in-line mounting, oil lubricated for 125 psig maximum working pressure.
- C. Casing: Cast iron with flanged pump connections.
- D. Impeller: Cast bronze, keyed to shaft.

- E. Bearings: Two oil lubricated bronze sleeves.
- F. Shaft: Stainless steel with bronze sleeve, integral thrust collar.
- G. Seal: Carbon rotating against a stationary ceramic seat, 212 deg F maximum continuous operating temperature.
- H. Drive: Closed coupled.
- I. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
- J. Motor: Epact Premium efficient style.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide access space around pumps for service. Provide no less than minimum as recommended by manufacturer.
- C. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. Provide supports under elbows on pump suction and discharge line sizes four inches and over for close coupled or base mounted pumps.
- D. Check, align, and certify alignment of base mounted pumps prior to start-up.
- E. Lubricate pumps before start-up.

3.03 SCHEDULES

- A. See the drawings.

END OF SECTION 23 2123

SECTION 23 2133
HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air vents
- B. Strainers
- C. Calibrated balance valves
- D. Automatic flow control valves
- E. Hydronic coil valve kit

1.02 RELATED SECTIONS

- A. Specification Section 23 2113 - Hydronic Piping
- B. Specification Section 23 2123 - Hydronic Pumps
- C. Specification Section 23 2500 - HVAC Water Treatment

1.03 REFERENCES

- A. ASME - Boilers and Pressure Vessel Codes, SEC 8-D-Rules for Construction of Pressure Vessels.

1.04 SUBMITTALS

- A. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description, model and dimensions.
- B. Submit inspection certificates for pressure vessels from authority having jurisdiction.
- C. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

1.05 PROJECT RECORD DOCUMENTS

- A. Record actual locations of flow controls

1.06 OPERATION AND MAINTENANCE DATA

- A. Maintenance Data: Include installation instructions, assembly views, lubrication instructions and replacement parts list.

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years experience.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to the site.
- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on cast iron and steel valves.
- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.09 MAINTENANCE SERVICE

- A. Furnish service and maintenance of glycol system for one year from date of substantial completion.

PART 2 PRODUCTS

2.01 AUTOMATIC AIR VENTS

- A. Float Type Manufacturers:
 - 1. Bell & Gossett #107
 - 2. Taco
 - 3. Dole
 - 4. Metraflex
 - 5. Patterson Pump
 - 6. Taco
 - 7. Engineer approved equal.
- B. Brass or semi-steel body, copper, polypropylene or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure with isolating valve.
- C. Washer Type: Brass with hygroscopic fiber discs, vent ports, adjustable cap for manual shut-off and integral spring loaded ball check valve.

2.02 Y STRAINERS

- A. Size 2" and Under:
 - 1. Manufacturers:
 - a. MetraFlex #TS
 - b. Mueller Steam Specialty
 - c. Watts
 - d. Yarway
 - e. Engineer approved equal.
 - 2. Screwed brass or iron body for 175 psig working pressure, "Y" pattern with 1/32 inch stainless steel perforated screen.
- B. Size 2-1/2 Inch to 4 Inches:
 - 1. Manufacturers:
 - a. Victaulic 732
 - b. MetraFlex #TF
 - c. Yarway
 - d. Watts
 - e. Engineer approved equal.
 - 2. Flanged or grooved iron body for 175 psig W.O.G. working pressure, basket pattern with 1/8 inch stainless steel perforated screen.
- C. Provide drain valve with hose connection and cap on all strainers.

2.03 CALIBRATED BALANCE VALVES

- A. Manufacturers:
 - 1. Armstrong Pumps, Inc.
 - 2. Bell & Gossett Circuit Setter Plus
 - 3. Flow Design
 - 4. Griswold Pro
 - 5. HCI
 - 6. Hydronic Specialties
 - 7. Taco
 - 8. Tour & Anderson
 - 9. Engineer approved equal.
- B. Orifice principal by-pass circuit with direct reading gauge, piping connections for 125 psig working pressure with shut off valves and drain and vent connections.
- C. Cast iron, wafer type, orifice insert flow meter for 250 psig working pressure with read-out valves equipped with integral check valves with gasket caps.

- D. Calibrated, plug type balance valve with precision machined orifice, readout valves equipped with integral check valves and gasket caps, calibrated nameplate and indicating pointer.

2.04 AUTOMATIC FLOW CONTROL VALVES (AUTO FLOW)

- A. Manufacturers:
 - 1. Bell & Gossett
 - 2. Danfoss
 - 3. FDI
 - 4. General Treatment Products
 - 5. Griswold
 - 6. HCI
 - 7. Pro Hydronic Specialties
 - 8. Engineer approved equal.
- B. Valves shall be factory set and shall automatically limit the rate of flow to required capacity within +/- 5% accuracy over an operating pressure differential of at least fourteen times the minimum required for control. Operating differential is not to exceed 3 psig.
- C. The control mechanism of the valve shall consist of a self-contained, open chamber cartridge assembly with unobstructed flow passages that eliminate accumulation of particles and debris. The cartridge shall be removable in one piece and all internal working parts shall be type #300 passivated stainless steel. The unit shall utilize the available differential pressure across the valve to actuate the control mechanism and shall be capable of self-cleaning the variable inlet ports over the full control range.
- D. Cast iron valve bodies shall be provided with inlet and outlet tappings and shall be marked to show direction of flow. Valve bodies shall be rated for use at not less than 150% of system designed operating pressures. Each valve shall be furnished with a kit consisting of 1/4" x 2" minimum size nipples, quick disconnect valves (located outside of insulation) and fittings suitable for use with measuring instruments specified.
- E. Provide submittal indicating certified performance data for the flow control valve, based on independent lab tests, supervised, and witnessed by a registered professional engineer. Provide documents showing actual pressure drop of units at scheduled gpm, including pressure drop through cartridge. Size for 3 psig maximum pressure drop at design flow rate.
- F. Provide a metal identification tag with chain for each installed valve. The tag to be marked with zone identification, valve model number, and rated flow in GPM.
- G. Flow control valves shall be warranted for a period of five years from date of substantial completion. The contractor shall furnish and install replacement cartridges with proper pressure range as required be test and balance agency to reach design flow.
- H. Integral shut off valve is allowed. Provide in accordance to Specification Section 23 2113 Hydronic Piping.
- I. Flow Measuring Instructions:
 - 1. Flow measuring instructions to verify flow rates shall be furnished.
 - 2. Correct flow shall be verified by establishing that the operating pressure differential across the valve tappings is within the range indicated on the submittal data sheet for that model number.

2.05 HYDRONIC COIL VALVE KIT

- A. Manufacturer:
 - 1. Bell & Gossett
 - 2. Danfoss
 - 3. FDI
 - 4. General Treatment Products
 - 5. Griswold
 - 6. Pro Hydronic Specialties
 - 7. Taco

8. Tour & Anderson
 9. HCI
 10. Engineer approved equal.
- B. Provide Coil Kit for for pipe sizes up to 2" per details and notes on drawings. The coil kits shall contain the following items.
1. Isolation ball valves with integral unions.
 2. Unions at coil piping connections.
 3. Wye strainer.
 4. Automatic flow control valve.
- C. Coil kit shall be pre-assembled, packaged, and tagged with the location and flow rate of the coil on which it is to be installed.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install specialties in accordance with manufacturer's instructions.
- B. Where large air quantities can accumulate, provide enlarged air collection standpipes.
- C. Provide manual air vents at system high points and as indicated.
- D. Provide vent tubing to nearest drain for automatic air vents in ceiling spaces or other concealed locations.
- E. Provide valved drain and hose connection on all strainer blow down connections.
- F. Remove pump suction filters and any other temporary strainers one week after system cleaning is finished.
- G. When system is filled with plain water, pipe relief valve outlet to nearest floor drain.

END OF SECTION 23 2133

SECTION 23 2500
CLEANING AND TREATMENT OF HYDRONIC SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cleaning of closed systems
- B. Treatment of closed systems
- C. Chemical treatment equipment

1.02 RELATED SECTIONS

- A. Specification Section 23 2113 - Hydronic Piping
- B. Specification Section 23 2133 - Hydronic Specialties

1.03 REFERENCES

- A. ASHRAE 188 - Legionellosis: Risk Management for Building Water Systems
- B. ASME B31.9 - Building Services Piping
- C. ASME - CRTD-34 - Consensus on Operation Practices for the Control of Feedwater and Boiler Water Chemistry in Modern Industrial Boilers
- D. ASME - Boilers and Pressure Vessel Codes, SEC 8-D-Rules for Construction of Pressure Vessels
- E. NFPA 70 - National Electrical Code

1.04 SUBMITTALS

- A. Shop Drawings: Indicate system schematic, equipment locations, controls schematics, electrical characteristics, and connection requirements.
- B. Product Data: Provide information on treatment materials, chemicals, and equipment including electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Indicate placement of equipment in systems, piping configuration, connection requirements, and start-up procedures.
- D. Manufacturer's Field Reports: Indicate start-up of treatment systems when completed and operating properly. Provide analysis of system water after final system cleaning, and after initial treatment regimen has been implemented.
- E. Field Report: Provide a service report, generated on-site by the water treatment representative, certifying that the cooling towers, chillers, fluid coolers, and other hydronic equipment have been cleaned, passivated, and started up in accordance with specifications and the procedures recommended by the equipment manufacturer.
- F. Field Report: Provide a service report, generated on-site by the water treatment representative, certifying that the boilers have been cleaned in accordance with specifications and the procedures recommended by the boiler manufacturer.
- G. Operation and Maintenance Data: Include data on treatment controllers, chemical feed pumps, and other equipment including spare parts lists, procedures, and treatment programs. Include step by step instructions on test procedures including target concentrations.
- H. Provide SDS Sheets for all chemical products.

1.05 PROJECT RECORD DOCUMENTS

- A. Record actual locations of equipment and piping, including sampling points, system blow-downs, and location of chemical injectors.
- B. Record volume of each hydronic system, as measured by water fill meter.

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum ten-years' experience. Company shall have local representatives with water analysis laboratories and full time service personnel.
- B. Installer: Company specializing in performing the work of this section and approved by manufacturer. The company must be a member of the Association of Water Technologies (AWT), or technical equivalent. The water treatment chemistry program shall be designed by an AWT "Certified Water Technologist" to meet the performance requirements defined by this specification and AWT guidelines.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable code for addition of non-potable chemicals to building mechanical systems.
- B. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.
- C. Biocide products shall be registered with the EPA, with the registration number clearly shown on drum labels.

1.08 MAINTENANCE SERVICE

- A. Furnish product, service, and maintenance, of treatment systems, for one year from Date of Substantial Completion.
- B. Provide monthly technical service visits to perform field inspections and make water analysis on site. Detail findings in writing on proper practices, chemical treating requirements and corrective actions needed. Submit two copies of field service report after each visit.
- C. Provide laboratory and technical assistance services during this maintenance period.
- D. Include two-hour training course for operating personnel, instructing them on installation, care, maintenance, testing, and operation of water treatment systems. Arrange course at startup of systems.
- E. Provide on-site inspections of equipment during scheduled or emergency shutdown to properly evaluate success of water treatment program, and make recommendations in writing based upon these inspections.

1.09 MAINTENANCE MATERIALS

- A. Provide sufficient chemicals for treatment and testing during service and warranty period.

PART 2 PRODUCTS

2.01 VENDORS

- A. G.E. Water & Process Technologies
- B. Jaytech
- C. Nalco
- D. US Water Services
- E. WaterLink
- F. Innovational Concepts
- G. Engineer approved equal.

2.02 CLEANING OF CLOSED SYSTEMS

- A. Provide all required materials and services to clean system of all oils, dirt, flux, pipe mill varnish, iron oxide corrosion by-products, and microbial agents. The process must be capable of removing grease and petroleum products, and must passivate all wetted surfaces in system including ferrous and non-ferrous piping, associated ferrous and non-ferrous pipe fittings, and mechanical equipment.
It is the responsibility of the mechanical contractor to coordinate the proper cleaning and

passivation of the hydronic systems. The mechanical contractor shall provide for the water treatment contractor the materials of construction, fill volumes, and other information required for cleaning and passivation of the hydronic systems.

B. Materials:

1. Cleaning: Alkaline compound with emulsifying agents and detergent of sufficient strength to completely clean system of all foreign substances.
2. Passivation: Provide passivation chemicals appropriate for construction of piping system. Provide protection for all ferrous and non-ferrous components. Coordinate with the mechanical contractor to provide protection for all materials of construction used in the system, including aluminum, brass, and other non-ferrous material.
3. Biocide: Provide required agents to bring biological growth within testing parameters.

C. Procedure:

1. Initial System Flush:
 - a. The system shall be filled with water and thoroughly flushed to remove any dirt and debris from the materials of construction. The system must be filled and drained from points which maximize flow throughout the entire loop. A system pressure of at least 10 psig must be maintained during the flush. Soft water shall be used to fill and flush heating water systems.
 - b. All valves and zones in the loop must be in the open position during the flushing process. Fully flush all dead-end branch piping.
 - c. The initial flush must last for at least four continuous hours.
 - d. Use temporary water meter to record volume in each system, for use by the water treatment contractor.
2. Secondary Flush and System Cleaning:
 - a. The system shall be filled with the passivating and cleaning agents.
 - b. The system must be circulated continuously for at least 48 hours. Provide additional cleaner or circulation time as required to properly clean old or fouled piping. If the system has a boiler, raise the loop temperature to 160°F to improve cleaning.
 - c. Once the cleaner has recirculated for at least 48 hours, the system must be flushed again.
 - d. The secondary flush must last for at least eight continuous hours. After the system has been flushed, samples must be taken at 3 different points in the system to verify the system is clean. The flush will be considered a success when a conductivity test, of the water exiting the loop, reads within 20% of the makeup water composition. Alternately, a Babcock/ Wilcox Millipore testing of the water exiting the loop contains less than 100 ppb of total suspended solids. Biological testing must show less than 100 RLUs/CFUs. The specified biocide must be applied at legal dosage rates if microbiological growth exceeds 100 RLUs/CFUs. The water treatment vendor, and commissioning authority, must verify that the flush has achieved the listed test parameters before this step is considered complete.
 - e. It is the responsibility of the mechanical contractor to coordinate the proper cleaning and treatment of closed loop systems with non-ferrous (aluminum, copper, etc.) components. Coordinate with the water treatment contractor to provide appropriate cleaners and treatments, that clean and protect the components, and comply with local and state laws.
 - f. It is the responsibility of the mechanical contractor to coordinate the proper cleaning and treatment of Geo-thermal systems. Provide appropriate cleaners and treatments that comply with local and state laws. Temporary cleaners, in a geothermal system, must be fully flushed from the system within one week of introduction.
 - g. All fill water must be metered, by mechanical contractor, and the volume recorded for use by the water treatment contractor.
3. Connection to existing system: Before a new connection is made to an existing glycol system, the water chemistry of the existing and new segments shall be analyzed to verify the compatibility of the union. Refer to Testing section for required values and ranges. If the existing and new segments are required to be joined, before final testing, for any

reason, the contractor is responsible to provide all cleaning and treatment, of all segments of the system required to achieve a complete system that meets the final testing requirements.

- D. Testing: Verify system cleanliness and system chemistries to ensure the specifications stated above are achieved. Collect samples from three different points in the system. Once complete, send results to project Engineer and commissioning authority for review.
1. Chemical Additions: Once inhibitor and or glycol has been added to the system, the system must be tested for glycol degradation, glycol concentration, system inhibitors, corrosion products, and system contaminants.

ITEM	ALLOWABLE RANGE
<u>System Properties</u>	
System pH	9.0-10.5
Glycol %	XX %
Copper	Within 30% of new system
Ferrous Iron	Within 50% of new system
Conductivity	Within 20% of new system
RFU/CFU	>100 per mill
<u>Heating System Inhibitors</u>	
Tolytriazole	2-7 ppm
Nitrite (NO ₂)	800-1200 ppm
<u>Cooling System Inhibitors</u>	
Molybdate (MoO ₄)	100-150 ppm
Silica (SiO ₂)	50-100 ppm
Nitrite (NO ₂)	800-1,500 ppm
Polyacrylate	20-60 FAU

If any of the above tests do not fall within required limits, the existing glycol system must be treated and retested, or flushed and refilled, to bring test results within range before new glycol can be added.

2. Final Testing: After final system fill, provide documentation system meets following conditions.

ITEM	ALLOWABLE RANGE
<u>Physical Properties</u>	
Sediment-Solids %	<0.01 wt%
Clarity	Clear
Conductivity	Within 20% of feed water
RFU/CFU	>100 per mil
Glycol Concentration	XX%
Freeze Point	XXF
pH	9.0-10.5
<u>Heating System Inhibitors</u>	
Tolytriazole (TTZ)	5-10 ppm
Nitrite (NO ₂)	800-1200 ppm
<u>Cooling System Inhibitors</u>	
Phosphate (PO ₄)	<1000 ppm
Borate (BO ₃)	25-50 ppm
Molybdate (MoO ₄)	100-150 ppm
Silica (ppm SiO ₂)	50-100 ppm

Corrosion/Oxidation Byproducts

Ferrous Iron	<1 ppm
Copper	<0.5 ppm
Combined Organic Acid	<300 ppm

Corrosive Ions & Scale Promoters

Chloride (CL)	<100 ppm
Sulfate (SO4)	<250 ppm
Calcium (CaCO3)	<100 ppm
Magnesium (Mg)	<30 ppm
Nitrate (NO3)	<100 ppm

2.03 TREATMENT OF CLOSED SYSTEMS

- A. Materials: Provide chemicals necessary to treat the system for cleaning, scale, corrosion, glycol (if necessary), microbiological growth, and fouling. When connecting to existing systems, new chemicals used must be completely compatible with the present treatment programs and not accelerate mechanical seal failures due to excessive total dissolved solids
1. Corrosion Inhibitors: Provide all chemicals and equipment necessary to achieve the following: (Phosphate based inhibitors are not permitted for treatment of heating water systems fed by hard water.)
 - a. Immediately after test results have confirmed that the loop has passed clean and flush inspection, closed loop inhibitor must be added to prevent flash corrosion of the loop.
 - b. The inhibitors shall protect all wetted materials of construction including ferrous and non-ferrous metals.
 - c. Maintain system essentially free of scale, corrosion and fouling.
 - d. Maximum Corrosion rate of 0.2 mils per year (mild steel) and 0.1 mils per year on brass, copper, and non-ferrous metals. Provide corrosion monitoring equipment.
 - e. Iron and suspended solids dispersion.
 - f. Produce no foam.
 - g. Buffering for pH control: 8.5 - 10.5
 - h. If the system is a geothermal system, the inhibitor must fall within the NSF/ANSI Standard 60 per DNR stipulations. Only drinking water approved additives shall be used.
 2. Biocides:
 - a. Shall be provided sufficient to maintain the system below 100 RLU.
 - b. Geothermal installations: Chemical biocides shall be used in a temporary basis only. All chemicals must be removed from the loop within one week of introduction.
- B. Testing: Provide tests of systems which verify system chemistry and cleanliness.
1. After inhibitor and or glycol has been added to the system it must be tested for glycol degradation, glycol concentration, system inhibitors, and system contaminants.
 2. Provide tests showing that the loop meets the following requirements:

PART 3 EXECUTION

3.01 PREPARATION

- A. Completely fill system, to operational conditions, for cleaning and passivation. The system must be filled, started, and vented prior to cleaning.
- B. Use temporary water meter to record capacity in each system. Verify meter is functional, calibrated, and installed per manufactures instructions.
- C. Place terminal control valves in open position during cleaning. All system zones must be open during flush and passivation.
- D. Refer to plans, details, and flow diagrams for locations and installation requirements.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions. Provide water treatment report from manufacturer's representative.

END OF SECTION 23 2500

SECTION 23 3100
HVAC DUCTS AND CASING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Materials
- B. Ductwork fabrication
- C. Manufactured ductwork and fittings

1.02 RELATED SECTIONS

- A. Specification Section 23 0593 - Testing, Adjusting, and Balancing for HVAC
- B. Specification Section 23 0713 - Duct Insulation.
- C. Specification Section 23 3300 - Air Duct Accessories.
- D. Specification Section 23 3700 - Air Outlets and Inlets.

1.03 REFERENCES

- A. ASTM A 90 - Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles
- B. ASTM A 525 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
- C. ASTM A 527 - Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip Process, Lock Forming Quality
- D. AWS D9.1 - Welding of Sheet Metal
- E. NFPA 90A - Installation of Air Conditioning and Ventilating Systems
- F. NFPA 90B - Installation of Warm Air Heating and Air Conditioning Systems
- G. SMACNA - HVAC Air Duct Leakage Test Manual
- H. SMACNA - HVAC Duct Construction Standards - Metal and Flexible
- I. UL 181 - Factory-Made Air Ducts and Connectors

1.04 PERFORMANCE REQUIREMENTS

- A. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.05 SUBMITTALS

- A. Shop Drawings: Indicate duct fittings, particulars such as gauges, sizes, welds, and configuration prior to start of work for four inch (4") pressure class and higher and kitchen hood exhaust systems.
- B. Product Data: Provide data for duct materials, duct liner, and duct connectors.

1.06 PROJECT RECORD DOCUMENTS

- A. Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.07 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- B. Maintain one copy of document on site.

1.08 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three-years experience.

- B. Installer: Company specializing in performing the work of this section with minimum three-years experience.

1.09 REGULATORY REQUIREMENTS

- A. Construct ductwork to NFPA 90A Standards.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Galvanized Steel Ducts: ASTM A924 and ASTM A653 galvanized steel sheet, lock-forming quality, having G60 zinc coating of in conformance with ASTM A90.
- B. Insulated Flexible Duct
 - 1. Manufacturers:
 - a. Thermaflex G-KM
 - b. Flexmaster
 - c. Atco
 - d. Engineer approved equal.
 - 2. UL 181, Class 1, NFPA 90A and 90B compliant, interlocking spiral of steal wire, fiberglass insulation with R value of 4.2 or greater; core shall be chlorinated polyethylene vapor barrier film. (Polyester is not acceptable). Outer shell/vapor barrier shall be metalized polyester or polyethylene film.
 - 3. Pressure Rating: Six inch (6") positive and one inch (1") negative.
 - 4. Maximum Velocity: 5000 fpm.
 - 5. Temperature Range: -20 to 180 deg F.
 - 6. Vapor Transmission: 0.1 perms or less (ASTM E96)
 - 7. Flex Elbows: Flex duct 90 degree elbow splines for connections to diffusers. Flex elbows shall prevent kinks in flex duct. Elbow spline shall be UL-2043 listed for use in plenums.
- C. Fasteners: Rivets, bolts or sheet metal screws.
- D. Duct Sealant
 - 1. Manufacturers:
 - a. Design Polymerics (DP1010)
 - b. Ductmate
 - c. Durodyne
 - d. Engineer approved equal.
 - 2. Description: Water based, non hardening, high velocity/high pressure duct sealant intended for indoor and outdoor HVAC ducts.
 - 3. Pressure Rating: 10" water column minimum.
 - 4. Service Temperature: -20 to 200F
 - 5. Listings
 - a. ASTM E-84/UL723 Flame/Smoke Spread: 25/50 or less.
 - b. UL-181B listed for use on Flex Duct connections.
 - c. Conforms to NFPA 90A & 90B requirements.
 - d. Approved for use on interior of ducts.
 - 6. VOC Content
 - a. 0 g/L
 - b. CDPH Standard Method v1.1 (14 days): Less than 5.0 mg/m3.
- E. Hanger Rod: ASTM A36; steel, galvanized; threaded both ends, threaded one end.

2.02 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gauges, reinforcing and sealing for operating pressures indicated.
- B. Increase duct sizes gradually, not exceeding 15 degree divergence wherever possible; maximum 30 degree divergence upstream of equipment and 45 degree convergence downstream.
- C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide airfoil turning vanes. Where acoustical lining is indicated, provide turning vanes of perforated metal with fiberglass insulation.
- D. Fabricate continuously welded round and oval duct fittings two gauges heavier than duct gauges indicated in SMACNA Standard. Joints shall be minimum four inch (4") cemented slip joint, brazed or electric welded. Prime coat welded joints.
- E. Provide standard 45 degree lateral wye takeoffs or 90 degree conical tee takeoffs.
- F. Fabricate all exposed ductwork using paint grip galvanized sheet metal.
- G. All outside air intake or relief ductwork above finished areas shall be caulked to be watertight. An auxiliary continuous drain pan shall be provided beneath these ducts to prevent damage in case of a waterproofing failure. Line this drain pan with 1/2 inch duct liner and turn up all edges.

2.03 MANUFACTURED DUCTWORK AND FITTINGS

- A. Manufacture in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible and as indicated. Provide duct material, gauges, reinforcing, and sealing for operating pressures indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- C. All ductwork shall be sealed to provide a SMACNA Seal Class A installation for all longitudinal seams, all transverse seams and all duct penetrations. Flame spread rating shall not exceed 25 and smoke developed shall not exceed 50 when tested in compliance with ASTM-E-84-87.
- D. Sealant shall be non-hardening and water resistant. Sealant shall be capable of being applied with a brush and shall be applied in accordance with manufacturer's instructions. Each seam or penetration shall be dressed after application of sealant for neat appearance.
- E. Ductwork shall be installed following essentially lines indicated on the drawings. Install offsets, and angles. Transitions may be required to avoid interference with other work and existing conditions. Maintain full capacity of ductwork.
- F. Flex Duct Installation:
 - 1. Maximum length of flex duct: 5ft
 - 2. Provide 90 deg elbow splines to prevent flex duct kinking, especially when connecting to ceiling diffusers
 - 3. Connections to rigid ducts and fittings: Peel back insulation and place flexible inner core over fitting and seal with two layers of duct tape (minimum 2" overlap on fitting and flex duct core). Install clamps over the top of the duct tape. Stretch insulation back over fitting and wrap with two layers of duct tape. Duct Sealant/Mastic may be substituted for the tape that seals the inner core to the fitting. Refer to manufacturer's instructions. Duct tape, mastic/sealant and clamps shall be UL181 listed.
- G. Duct sizes are net outside dimensions. Maintain outside sizes for lined ducts. Do not increase duct dimensions.

- H. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- I. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- J. Use crimp joints with or without bead for joining round duct sizes eight inch (8") and smaller with crimp in direction of airflow.
- K. Use double nuts and lock washers on threaded rod supports.
- L. Connect diffusers to low pressure ducts directly or with five foot (5') maximum length of flexible duct held in place with strap or clamp.
- M. Connect flexible ducts to metal ducts with draw bands.
- N. Set plenum doors six inch (6") to 12 inches above floor. Arrange door swing so that fan static pressure holds door in closed position.
- O. During construction, provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- P. All joints in rectangular rigid round or oval ductwork that exceeds 100 inches in perimeter length shall be made with the "Ductmate Industries" flanged and caulked joint system.
- Q. For units with filtered return air grilles (fan coils, blower coils, heat pumps, etc.), remove the unit filter and connect the return air ductwork tight to the unit. The return duct shall match the size of the unit return air opening.

3.02 SCHEDULES

DUCTWORK MATERIAL

AIR SYSTEM	MATERIAL
Low Pressure Supply	Galvanized Steel
Return and Relief	Galvanized Steel
General Exhaust	Galvanized Steel
Outside Air Intake	Galvanized Steel

DUCTWORK PRESSURE CLASS

AIR SYSTEM	PRESSURE CLASS
Supply	2"
Return and Relief	1"
General Exhaust	1"
Outside Air Intake	1/2"

END OF SECTION 23 3100

SECTION 23 3300
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air turning devices/extractors
- B. Smoke dampers
- C. Duct access doors
- D. Duct test holes
- E. Fire dampers
- F. Volume control dampers
- G. Ductwork flow sensors

1.02 RELATED SECTIONS

- A. Specification Section 23 3100 - HVAC Ducts and Casings.

1.03 REFERENCES

- A. NFPA 90A - Installation of Air Conditioning and Ventilating Systems
- B. NFPA 70 - National Electrical Code
- C. SMACNA - HVAC Duct Construction Standards - Metal and Flexible
- D. UL 33 - Heat Responsive Links for Fire-Protection Service
- E. UL 555 - Fire Dampers and Ceiling Dampers
- F. UL 555S - Leakage Rated Dampers for use in Smoke Control Systems

1.04 SUBMITTALS

- A. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers and all accessories.
- B. Product Data: Provide for shop fabricated assemblies including volume control dampers, duct access doors, and fire and smoke dampers. Include electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Indicate for combination fire and smoke dampers.

1.05 PROJECT RECORD DOCUMENTS

- A. Record actual locations of access doors or test holes.

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years experience.

1.07 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories Inc., as suitable for the purpose specified and indicated.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Architectural Specification Sections.
- B. Protect dampers from damage to operating linkages and blades.

1.09 EXTRA MATERIALS

- A. Provide two of each size and type of fusible link for each style or type of fire damper or combination fire/smoke damper furnished for this project.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS

- A. Multi-blade device with radius blades attached to pivoting frame and bracket, steel construction with push-pull operator strap.

2.02 SMOKE DAMPERS

- A. Manufacturers:
 - 1. Ruskin
 - 2. Greenheck
 - 3. United Enertech
 - 4. Nailor
 - 5. Air Balance
 - 6. NCA
 - 7. Pottorff
 - 8. Engineer approved equal.
- B. Fabricate in accordance with NFPA 90A, UL 555S (latest edition) and as indicated.
- C. Provide factory sleeve and collar for each damper.
- D. Ratings (refer to code review plans for wall classifications):
 - 1. Smoke: Leakage class II and in accordance with UL 555S.
 - 2. Temperature: 350F
 - 3. Air velocity: 4000 fpm
 - 4. Differential Pressure: 4" WC
- E. Multiple Blade Dampers (Vertical & Horizontal):
 - 1. Minimum 16 gauge galvanized steel frame and 6 inch (6") maximum width 3-V shape roll formed galvanized steel blades.
 - 2. Oil-impregnated bronze or stainless steel sleeve bearings and plated steel axels.
 - 3. Stainless steel jamb seals.
 - 4. 1/8" x 1/2" plated steel concealed linkage.
 - 5. Factory installed sleeve. Provide extended length sleeves where required
 - 6. Stainless steel closure spring, blade stops and lock.
 - 7. 1/2 inch actuator shaft.
- F. Operators:
 - 1. UL listed and labeled spring return electric type suitable for 120 volts, single phase, 60 Hz.
 - 2. Locate damper operator on exterior of duct and link to damper operating shaft.
 - 3. Operator shall have open/close labeling to indicate damper position. Provide factory identification to determine damper position.
- G. All damper motors shall be quiet operating. Stall type motors shall not be allowed.
- H. Accessories:
 - 1. Factory installed duct smoke detector in the damper sleeve with factory installed wiring from the actuator to the smoke detector. Option provides a single point power connection. Duct detector shall be rated for no flow condition.

2.03 DUCT ACCESS DOORS

- A. Manufacturers:
 - 1. Ruskin
 - 2. Nailor
 - 3. Engineer approved equal.
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.

- C. Fabrication: Rigid and close fitting of galvanized steel with sealing gaskets and quick fastening locking devices. Install minimum one inch (1") thick insulation with sheet metal cover for insulated ductwork.
 - 1. Less Than 12 Inch Square: Secure with sash locks.
 - 2. Up to 18 inch Square: Provide two hinges and two sash locks.
 - 3. Up to 24 inch x 48 Inches: Three hinges and two compression latches with outside and inside handles.
 - 4. Larger Sizes: Provide an additional hinge.
- D. Access doors with sheet metal screw fasteners are not acceptable.

2.04 DUCT TEST HOLES

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches or neoprene plugs.
- B. Permanent Test Holes: Factory fabricated, airtight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.05 FIRE DAMPERS

- A. Manufacturers:
 - 1. Ruskin
 - 2. Greenheck
 - 3. United Enertech
 - 4. Nailor
 - 5. Air Balance
 - 6. NCA
 - 7. Pottorff
 - 8. Engineer approved equal.
- B. Fabricate in accordance with NFPA 90A and UL 555 (latest edition) and as indicated.
- C. Ratings (refer to code review plans for wall classifications):
 - 1. 1-1/2 hours in accordance with UL-555
 - 2. 3 hours in accordance with UL-555
 - 3. Air Velocity: 3000 fpm
 - 4. Differential Pressure: 4" WC
- D. Multiple Blade Dampers (Vertical & Horizontal):
 - 1. Minimum 16 gauge galvanized steel frame and 6 inch (6") maximum width 3-V shape roll formed galvanized steel blades.
 - 2. Oil-impregnated bronze or stainless steel sleeve bearings and plated steel axels.
 - 3. 1/8" x 1/2" plated steel concealed linkage.
 - 4. Stainless steel closure spring, blade stops and lock.
 - 5. Locate damper operator on exterior of duct and link to damper operating shaft. Operator shall have open/close labeling to indicate damper position. Provide factory identification to determine damper position.
 - 6. Factory installed sleeve. Provide extended length sleeves where required
 - 7. Provide with round duct transitions where required.
 - 8. Fusible Link: UL 33, separate at 212 deg F with adjustable link straps for combination fire/balancing dampers.

2.06 VOLUME CONTROL DAMPERS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- B. Single Blade Dampers: Fabricate for duct sizes up to 6" x 30 inches.
- C. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 inches x 72 inches. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.

- D. End Bearings: Except in round ductwork 12 inch and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.
- E. Quadrants:
 - 1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
 - 2. On insulated ducts mount quadrant regulators on standoff mounting brackets, bases or adapters.
 - 3. Where rod lengths exceed 30 inches, provide regulator at both ends.

2.07 DUCTWORK FLOW SENSORS (FS)

- A. Manufacturers:
 - 1. Titus #EXX
 - 2. Redi-Flow
 - 3. Metal Aire
 - 4. Ruskin
 - 5. Krueger
 - 6. Price
 - 7. Engineer approved equal.
- B. Furnish airflow sensors where indicated.
- C. Sensors shall be pre-installed in a section of round ductwork with total pressure and static pressure pneumatic ports mounted on exterior.
- D. Sensor shall be multi-port, cross or ring pattern.
- E. Combination volume and ductwork flow sensors equal to Ruskin #VFBD35 are acceptable as equal. Provide with submittal.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers at fire dampers, combination fire and smoke dampers and elsewhere as indicated. Review locations prior to fabrication.
- C. Provide duct test holes where indicated and required for testing and balancing purposes.
- D. Provide fire dampers, combination fire and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components and where required by authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, and breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
- E. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92A.
- F. Demonstrate re-setting of fire dampers to owner's representative.
- G. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment and supported by vibration isolators. Use braided stainless steel flexible connections to equipment located within a one hour rated area.
- H. Provide volume balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum two duct widths from duct take-off. Drawings may not indicate all volume damper locations.
- I. Provide volume balancing dampers on duct take-off to diffusers, grilles and registers, regardless of whether dampers are specified as part of the diffuser, grille or register assembly. Locate as

close as possible yet accessible to the main trunk duct. Drawings may not indicate all volume damper locations.

- J. The electrical contractor shall wire smoke damper operators.
- K. Provide turning vanes in all supply, return and exhaust ductwork unless noted otherwise. Turning vanes shall not be installed in kitchen hood exhaust, dishwasher hood exhaust and kiln hood exhaust.
- L. Install ductwork flow sensor in such a way that it is easily accessible for balancing of system. Provide manual volume damper downstream of flow sensors.
- M. Provide original installation inspection during construction and 11-month re-inspection after substantial completion of all existing and new fire/smoke/fire smoke dampers in all HVAC systems serving project's construction area. Mechanical Contractor shall adjust, fix or replace any damper found not to meet installation requirements. Provide an electronic log of all dampers with size, location, pre-inspection condition and post-inspection condition to Owner and Design Team after original inspection and after re-inspection of fire/smoke/fire smoke dampers.

END OF SECTION 23 3300

SECTION 23 3421
ENERGY RECOVERY VENTILATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Energy recovery ventilator

1.02 RELATED SECTIONS

- A. Specification Section 23 3100 - HVAC Ducts and Casings.
- B. Specification Section 23 3300 - Air Duct Accessories.
- C. Specification Section 23 2923 - Variable Frequency Drives

1.03 SYSTEM DESCRIPTION

- A. Unit is capable of transferring sensible and latent energy as listed in the equipment schedule.
- B. Unit is designed to be used as a stand-alone energy recovery ventilator or an energy recovery component in a dedicated HVAC system or as a complete ventilation/HVAC unit with the addition of optional heat/cool accessory modules.
- C. Energy recovery wheel to be factory installed in unit.

1.04 QUALITY ASSURANCE

- A. Unit shall be constructed in accordance with CSA C22.2 and UL 1995 and shall carry the ETLus and ETLc label of approval.
- B. Insulation shall comply with NFPA 90A requirements for flame spread and smoke generation.
- C. Airflow data shall comply with AMCA 210 method of testing.
- D. All units shall be run tested prior to shipment.

1.05 DELIVERY, STORAGE HANDLING

- A. Unit shall be stored and handled per unit manufacturer's recommendations.

1.06 REFERENCES

- A. AMCA 99 - Standards Handbook
- B. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes
- C. AMCA 261 - Directory of Products Licensed to Bear the AMCA Certified Ratings Seal
- D. AMCA 300 - Test Code for Sound Rating Air Moving Devices
- E. AMCA 301 - Method of Publishing Sound Ratings for Air Moving Devices
- F. NEMA MG1 - Motors and Generators
- G. UL 705 - Power Ventilators

1.07 SUBMITTALS

- A. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.
- B. Manufacturer's Instructions: Indicate installation instructions.

1.08 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.

1.09 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 ENERGY RECOVERY VENTILATOR

- A. Manufacturers:
 - 1. Oxygen8
 - 2. Renewaire
 - 3. Engineer approved equal.
- B. Performance:
 - 1. Energy transfer shall be capable of transferring both sensible and latent energy between air streams. Latent energy transfer shall be accomplished by direct water vapor transfer from one air stream to the other without exposing transfer media in succeeding cycles directly to the exhaust air and then to the fresh air.
 - 2. Positive air stream separation water vapor transfer shall be through molecular transport by hygroscopic resin and shall not be accomplished by "porous plate" mechanisms. Exhaust and fresh air streams shall at all times travel in separate passages, and air streams shall not mix.
 - 3. Airflow through the energy exchange element shall be laminar, avoiding deposition of particulates on the interior of the energy exchange plate materials.
 - 4. Filters: Provide 2" MERV-8 filters on both the outside air and return air.
 - 5. Accessories:
 - a. Provide two-position control dampers on the outside air and exhaust air connections.
 - b. Provide an electric preheat coil on the outside air into the ERV.
 - c. Provide a hot-water heating coil on the supply air out of the ERV.
 - d. Provide a chilled-water cooling coil on the supply air out of the ERV.
 - 6. Controls:
 - a. Provide a factory-mounted control panel. Integration shall be BACnet MS/TP.
 - b. Refer to Specification Section 23 0993 Sequence of Operation for additional information.
- C. Substitutions: Energy recovery wheels may be considered as an equal. Manufacturers shall provide required electric defrost and controls. Manufacturer shall include all costs for required electrical changes in the bid.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure roof or wall exhausters with cadmium plated steel lag screws to roof curb or structure.
- C. Extend ducts to roof or wall exhausters into roof curb or structure. Counterflash duct to roof or wall opening.
- D. Provide sheaves required for final air balance.
- E. Install backdraft dampers on inlet to roof and wall exhausters.
- F. Do not operate fans until ductwork is clean, filters are in place, and bearings are lubricated.
- G. If equipment is to be operated prior to building turn over to the owner, the mechanical contractor must install filter media on all return and exhaust grilles.

3.02 SCHEDULES

- A. See drawings.

END OF SECTION 23 3421

SECTION 23 3700
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Diffusers/registers/grilles
- B. Louvers

1.02 REFERENCES

- A. ADC 1062 - Certification, Rating and Test Manual
- B. AMCA 500 - Test Method for Louvers, Dampers and Shutters
- C. ARI 650 - Air Outlets and Inlets
- D. ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Outlets and Inlets
- E. SMACNA - HVAC Duct Construction Standard - Metal and Flexible
- F. NFPA 70 - National Electrical Code
- G. NFPA 90A - Installation of Air Conditioning and Ventilating Systems

1.03 SUBMITTALS

- A. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Review ceiling type and style before submitting. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

1.04 PROJECT RECORD DOCUMENTS

- A. Record actual locations of air outlets and inlets.

1.05 QUALITY ASSURANCE

- A. Test and rate air outlet and inlet performance in accordance with ADC Equipment Test Code 1062 and ASHRAE 70.
- B. Test and rate louver performance in accordance with AMCA 500.

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years experience.

PART 2 PRODUCTS

2.01 DIFFUSERS/REGISTERS/GRILLES

- A. Manufacturers:
 - 1. Titus
 - 2. Carnes
 - 3. Tuttle & Bailey
 - 4. Price Ind.
 - 5. Krueger
 - 6. Nailor
 - 7. Engineer approved equal.
- B. Refer to schedule on drawings for style, size, and finish.

2.02 LOUVERS

- A. Manufacturers:
 - 1. Ruskin #ELF
 - 2. American Warming
 - 3. Louvers and Dampers, Inc.
 - 4. Pottorff
 - 5. Greenheck

6. United Enertech
 7. Air Balance
 8. Engineer approved equal.
- B. Type: Drainable blades on 37-1/2 degree slope, heavy channel frame bird screen with 1/2 inch square mesh for exhaust and 3/4 inch for intake. (See drawings).
 - C. Fabrication: Extruded aluminum, 0.080 inch thick welded assembly with factory anodized finish. Color to be selected by architect. Architect has authority to select multiple colors.
 - D. Mounting: Furnish with exterior flat flange for installation. Verify with architect prior to ordering.
 - E. Interior louvers shall be constructed of 0.125 inch thickness with welded construction.
 - F. Refer to drawings for louver dimensions.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position and type to conform to architectural features, symmetry, and lighting arrangement.
- C. Install diffusers to ductwork with airtight connection.
- D. Provide balancing dampers on duct take-off to diffusers, grilles and registers, despite whether dampers are specified as part of the diffuser or grille and register assembly.
- E. Paint ductwork visible behind air outlets and inlets matte black.
- F. Provide a cable operated damper or access panel where a balancing damper is located above gypsum ceilings or in an inaccessible location. Externally cable operated damper shall be similar to Ruskin ZCDR25.

3.02 SCHEDULES

- A. See drawings.

END OF SECTION 23 3700

SECTION 23 8101

TERMINAL HEAT TRANSFER, CONVECTION HEATING, AND COOLING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fan coil units

1.02 RELATED SECTIONS

- A. Specification Section 23 0993 - Sequence of Operation for HVAC Controls
- B. Specification Section 23 2113 - Hydronic Piping
- C. Specification Section 23 2133 - Hydronic Specialties

1.03 REFERENCES

- A. NFPA 70 - National Electrical Code

1.04 SUBMITTALS

- A. Product Data: Provide typical catalog of information including arrangements.
- B. Shop Drawings:
 - 1. Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations.
 - 2. Submit schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers and comparison of specified heat required to actual heat output provided.
 - 3. Indicate mechanical and electrical service locations and requirements.
- C. Manufacturer's Instructions: Indicate installation instructions and recommendations.
- D. Project Record Documents: Record actual locations of components and locations of access doors in radiation cabinets required for access or valve.
- E. Operation and Maintenance Data: Include manufacturers descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.
- F. Warranty: Submit manufacturer's warranty and ensure forms have been completed in owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three-years experience.

1.06 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.

1.07 WARRANTY

- A. Provide one-year manufacturer's warranty for condensing units and compressors.

PART 2 PRODUCTS

2.01 FAN COIL UNITS

- A. Manufacturers:
 - 1. Airtherm
 - 2. Daikin
 - 3. Greenheck
 - 4. Johnson Controls
 - 5. Price
 - 6. The Trane Co.
 - 7. Williams
 - 8. Zehnder Rittling
 - 9. Engineer approved equal.

- B. Coils:
 - 1. Hydronic Coils: Evenly spaced aluminum fins mechanically bonded to copper tubes designed for 200 psi and 220 deg F. Provide drain pan under cooling coil (easily removable for cleaning) with drain connection. Drain pan shall be thermoplastic or stainless steel. Galvanized pans are not acceptable.
- C. Construction:
 - 1. Chassis and internal supports shall be 20 gauge galvanized steel.
 - 2. Grilles: Exposed and recessed units shall have stamped or prefabricated bar grilles.
 - 3. Insulation: 1/2 inch closed cell insulation.
- D. Finish: Factory applied baked enamel unless otherwise noted. Submit color chart for architect selection.
- E. Fans: Centrifugal forward-curved double-width galvanized wheels, statically and dynamically balanced, direct driven.
- F. Motor: Electronically Commutated Motor (ECM) direct drive motor with thermal overload protection. Motors shall have capability for on/off and 0-10 vdc control. PCM motors are not acceptable.
- G. Filter: Easily removed one inch thick fiberglass throw-away type, Merv 6, located to filter air before coil.
- H. Electrical:
 - 1. Unit shall have built in transformers to allow for a single point power connection.
 - 2. Provide the manufacturer's electrical disconnect.
- I. Controls:
 - 1. Provide condensate overflow switch.
 - 2. Refer to Specification Section 23 0993 Sequence of Operations for additional information.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install equipment exposed to finished areas after walls and ceilings are finished and painted. Avoid damage.
- C. Protection: Provide finished cabinet units with protective covers during balance of construction.
- D. Fan-Coil Units: Install as indicated. Adjust unit location for proper service access.
- E. Hydronic Units: Provide with shut off valve on supply and lock shield-balancing valve on return piping, unless otherwise shown on piping details. If not easily accessible, extend vent to exterior surface of cabinet for easy servicing. Provide manual air vents for all hydronic coils.
- F. Units with Cooling Coils: Provide drain pan with indirect connection to condensate drain.

3.02 CLEANING

- A. After construction is completed, including painting, clean exposed surfaces of all units. Vacuum clean the coils and inside of the cabinets.
- B. Touch-up marred or scratched surfaces of factory-finished cabinets using finish materials furnished by the manufacturer.
- C. Install new filters.

3.03 SCHEDULES

- A. See drawings.

END OF SECTION 23 8101

SECTION 26 0050
BASIC ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Basic Electrical Requirements specifically applicable to Electrical Division Specification Sections.
- B. Division 26 Specification requirements also include, by reference, all Division 00 and 01 specification sections. This contractor is responsible to review these specification sections. Requirements of these specification sections are included as a part of this contract.
- C. Division 26 Specification requirements also include, by reference, Specification Section 08 7100 - Door Hardware. Review and inclusion of the electrical requirements of this specification section are included as a part of this contract.

1.02 OWNER OCCUPANCY

- A. The owner will occupy the premises during the construction period.
- B. Limit use of site and premises to allow owner occupancy.
- C. Cooperate with the owner to minimize conflict and to facilitate owner's operations.
- D. Schedule the work to accommodate this requirement.

1.03 REGULATORY REQUIREMENTS

- A. This contractor shall give proper authorities all requisite notices relating to work in their charge, obtain official permits, licenses for temporary construction and pay proper fees for it.
- B. This contractor is to be solely answerable for and shall promptly make good all damage, injury or delay to other contractors, to neighboring premises or to persons or property of the public by themselves, by their employees or through any operation under their charge, whether in the contract or extra work.
- C. No attempt has been made to reproduce in these specifications any of the rules or regulations contained in city, state or federal ordinances and codes pertaining to the work covered by these specifications that the contractor be thoroughly familiar with all such ordinances and codes.
- D. The fact that said various rules, regulations and ordinances are not repeated in this specification does not relieve the contractor of the responsibility of making the entire installation in accordance with the requirement of those authorities having jurisdiction.
- E. All work shall comply with the applicable recommendations of:
 - 1. The National Board of Fire Underwriters
 - 2. The ANSI-NFPA 70 National Electrical Code
 - 3. The National Fire Protection Association (NFPA)
 - 4. The Occupations Safety and Health Act (OSHA)
 - 5. IBC Building Code (current) and any current applicable city building and or electrical codes.
 - 6. Fire Protection: Conform to International Fire Code (IFC) and NFPA.
 - 7. International Energy Conservation Code (IECC)
- F. Obtain permits and request inspections from authority having jurisdiction.
- G. Conform to latest approved versions of codes.

1.04 PROJECT/SITE CONDITIONS

- A. Install work in locations shown on drawings unless prevented by project conditions.
- B. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to work specified in other sections. Obtain permission of owner and architect/engineer before proceeding.
- C. This contractor, before submitting their bid, shall visit the site of the project to familiarize themselves with locations and conditions affecting their work.

- D. It is the intent of this specification that the contractor furnish all labor and material required to complete the installation as outlined in the drawings and specifications. No additions to the contract price will be allowed due to the failure of this contractor to properly evaluate the effect of existing conditions on the work to be done under this contract.
- E. Whenever renovation or remodeling or relocation of existing equipment is included in the contract, it is imperative that all locations of existing wiring conduits, electrical panels, equipment, services and grades be noted on the job site before bid is submitted and that all elevations and grades be verified before roughing in new work.
- F. This contractor shall provide, as necessary, for the installation of their work and in accordance with materials other than the structure.

1.05 SEQUENCING AND SCHEDULING

- A. This contractor shall arrange their work in order that it progresses along with the general construction of the building.
- B. This contractor shall be kept informed as to the work of other trades engaged in the project and shall execute their work in such a manner so as not to delay or interfere with progress of other contractors.
- C. Where space for mechanical and electrical lines and piping is limited, it is imperative that all such trades coordinate their work so as to ensure concealment in space provided. Where conflict exists, the engineer shall decide priority of space. If work is not properly coordinated, the engineer may require removal and relocation of work without additional compensation.

1.06 GUARANTEE

- A. This contractor shall guarantee all of the apparatus, materials, equipment furnished, and labor installed under this contract for a period of one year after date of final acceptance, unless a longer period is specified.
- B. Neither final certificate of payment nor any provisions in the contract documents nor partial or complete occupancy of premises by owner shall constitute an acceptance for work not done in accordance with contract documents or relieve the contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship.
- C. Should any defects arise as the result of defective workmanship or material within the guarantee period set forth, this contractor shall make the necessary correction at their own expense.

1.07 ENGINEER APPROVED EQUAL PRODUCTS

- A. When the engineer, at the request of the interested parties, including the contractor, supplier and manufacturer approved "engineer approved equal" products for this project, such products are approved on the assumption that they will equal or exceed the performance of the products specified.
- B. If such products do not do so after being installed on this project, this contractor shall replace or modify the particular product as necessary to equal the performance of the products specified at no expense to the owner, architect or engineer.
- C. Request for "engineer approved equal" products shall be received by the architect/engineer prior to the last addendum being issued. Requests for substitutions received after this date will not be considered. Substitution requests shall clearly state which products are being considered for substitution. Substitution requests shall include all pertinent product information needed to evaluate the substitution as an "equal".
- D. Similar products shall be all of the same manufacturers and style. There is no exception to this unless prior approval has been granted from engineer.

1.08 OWNER'S RIGHT OF SALVAGE

- A. Before beginning construction, the contractor shall check and verify with the owner each item of existing equipment that must be removed.

- B. The owner will designate which items of material or equipment not reused that they may wish to keep. The contractor shall then remove these items with care and store in a location designated by the owner for the owner's disposal.
- C. All other items of equipment to be removed and not specified for reuse in new construction or reserved by the owner for their use shall become the property of the contractor and shall be removed from the site.

1.09 PROTECTION AND MAINTENANCE

- A. The work covered by these drawings and specifications may involve work in both new and remodeled areas of the building.
- B. Where necessary to connect to any existing utility service, this electrical contractor shall contact the owner and shall coordinate any building service connection with the owner so that normal operation to the building is disrupted as little as possible.
- C. Any work to be done in existing structures shall be coordinated with the owner and arrangements made so that traffic flow may be maintained and areas finished where possible before other areas are begun.
- D. This contractor shall protect existing equipment in finished areas from dirt, dust and damage as a result of their work.
- E. Coordinate protection requirements with department heads before beginning construction.
- F. Protect any building openings from unauthorized entry. Coordinate with owner where building entry must be controlled.

1.10 DEMOLITION

- A. This contractor shall be responsible for the demolition and removal of all existing electrical elements within the project area except as follows:
 - 1. Elements shown on the drawings as "existing to remain and/or to be reused".
 - 2. Elements serving adjacent areas.
 - 3. Elements required for the support of the newly remodeled areas.
 - 4. All elements to be removed are subject to the Owner's Right of Salvage.
- B. Preserve services to the existing facility. Extend/reroute/reconnect the existing systems as required providing for the continued function of these systems.

1.11 CUTTING AND PATCHING

- A. This contractor shall do all cutting and patching necessary for the installation of his work in all existing and new buildings unless otherwise noted.
- B. In areas where the integrity of new or existing fire separation assembly/wall is compromised by the work, this contractor shall be responsible to patch and/or seal openings as necessary to maintain and/or return fire separation to rating as required by applicable codes.
- C. This contractor shall do all cutting and patching required for his work beyond the remodeled areas unless otherwise noted. All finish work shall include patching to match existing adjacent surfaces. Painting shall be by others.

1.12 CLEANING AND RUBBISH

- A. This contractor, upon completion of their work, shall remove all rubbish and debris resulting from their operation and shall remove it from site at their own expense.
- B. As far as their work is concerned, all equipment shall be cleaned and the premises left in first class condition.
- C. This contractor shall maintain the work area each day to prevent hazardous accumulation of waste from their work.

1.13 SEALING AND PENETRATION

- A. Clearance around the piping passing through fire or smoke rated construction shall be sealed to maintain the rated integrity of the construction (1 hr. 2 hrs. etc.). One and two-hour rated assemblies are to be patched on both sides of the assembly.
- B. This contractor shall verify rating and location of all such construction with the architectural drawings and seal all penetrations.
- C. Manufacturer offering products to comply with the requirements include the following:
 - 1. Dow Corning "Silicone RTV Foam"
 - 2. 3-M Corporation "Fire Barrier Caulk and Putty"
 - 3. Thomas & Betts "Flame Safe Fire Stop System"
- D. Installation of these products are to be in strict accordance with the manufacturer's recommendations.
- E. This contractor shall submit shop drawings showing approved sealing assemblies to be utilized on this project.

1.14 ELECTRICAL CONNECTIONS

- A. This contractor shall mount and wire all magnetic starters, thermal protective switches, and speed changing switches furnished under the mechanical contract and install such starters and switches and wire them to their respective motors as a part of the electrical contract.
- B. All other magnetic starter switches, safety switches and speed control devices indicated on the electrical drawings or specifications are the responsibility of the electrical contractor to furnish and install.
- C. Unless specifically stated elsewhere, the wiring of the temperature control system shall be the responsibility of the mechanical contractor.
- D. The contractor shall provide line voltage power and rough-in for Fire Alarm system. Coordinate required line voltage and installation locations prior to bid.

1.15 HAZARDOUS MATERIALS

- A. If the contractor stores any hazardous solvents or other materials on the site, they shall obtain copies of the safety data sheets for the materials and post them at the site. The contractor shall inform the owner and all employed of any potential exposure to this material.
- B. At no time shall any product containing asbestos be incorporated into the work.
 - 1. If asbestos materials are encountered, report to the owner. The owner will be responsible for asbestos removal.

1.16 AS-BUILT DRAWINGS

- A. This electrical contractor shall provide (at the conclusion of the project) one clean, non-torn, neat and legible "as-built" set of drawings to the owner. These drawings shall show the routing of conduit, wiring and equipment drawn in at scaled locations. All circuits shall be labeled and shall conform to labeled panel breakers. All dimensions indicated shall be referenced to a column line. A set of construction drawings will be furnished for this work.
- B. All electrical panels and electrical installed equipment shall be shown on the "as-built" drawings.
- C. Refer to General Specification Sections for additional requirements.
- D. This contractor shall update these drawings during the project at least once a week.

1.17 ALTERNATES

- A. Refer to description of alternate bids under General Specification Sections.

1.18 REVIEW OF MATERIALS

- A. This contractor shall submit to the engineer for review one (1) electronic copy giving a complete list of materials, fixtures, devices and panels they propose to furnish. The brochure shall contain complete information as to the make of equipment, type, size, capacities, dimensions, and illustration. One of the returned copies shall be kept on the job at all times.

- B. Checking of submittal drawings by the engineer does not relieve the contractor of the responsibility for the accuracy of such drawings and for their conformity to drawings and specifications unless the contractor notifies engineer, in writing, of such deviation at time such drawings are furnished.
- C. All submittals shall have the date marked on them when the contractor receives them from the supplier. Submittals shall be submitted through the contractor and shall not come direct from the supplier to the architect or engineer.
- D. This contractor shall mark the date and sign each set. This indicates that each of them have been checked in their entirety before submitting to the engineer. Submittals that are not dated and signed by the contractor will not be accepted or checked and will be marked "resubmit" and sent back to the contractor.

1.19 TEST OF SYSTEMS

- A. This contractor shall, before concealed, test all systems installed under this contract as called for in these specifications and as required by local codes. Tests shall be made in the presence of the engineer, local authorities or their duly authorized representative. Any defects discovered in testing shall be corrected and the tests repeated until all defects are eliminated.
- B. This contractor shall be held responsible for all damage resulting from defects in the system.
- C. Each individual feeder circuit shall be tested at the panel and in testing for insulation resistance to ground; the power equipment shall be connected for proper operation. In no case shall the insulation resistance to ground be less than that required by the National Electrical Code (NEC).
- D. For 480V systems that are 1,000 amps or greater, this contractor shall provide primary injection testing to satisfy the requirements of the National Electrical Code (NEC) to ensure the ground-fault protection system has been performance tested when first installed on-site and provide a written record of this test to the Owner once completed.

1.20 SCOPE OF WORK

- A. This contractor shall furnish all the labor and material necessary to install a complete electrical system for the building. The system shall include all items of work as outlined in these specifications and on the drawings.
- B. All work shall be performed by a well-qualified, licensed electrician with a thorough knowledge of the various systems involved in this building. It shall be this contractor's responsibility to see that their employees are familiar with all the various codes and tests applicable to this work.
- C. All equipment shall be new and of the type specified by the engineer unless otherwise noted in these specifications or on the drawings to remain and or be reused.
- D. The intent of the specifications and drawings is for complete installation of the systems outlined in the specifications and drawings so that at the conclusion of construction the system will be turned over to the owner complete and ready for safe and efficient operation. The specifications and drawings cannot deal individually with the many minute items that may be eventually required by the nature of the systems.
- E. This contractor is required to furnish and install all such items normally included on systems of this type, which, while not mentioned directly herein or on the drawings are obviously essential to the installation and operation of the system and which are normally furnished on quality installation of this type.
- F. This contractor, before proceeding with any work, shall review the architectural drawings. Any conflict between the electrical and architectural drawings shall be reported to the engineer for clarification.
- G. If there is a discrepancy between the drawings and the specifications or within either document, the more stringent requirement shall be estimated unless brought to the engineer's attention and an addendum is issued for clarification.
- H. The Electrical Contractor shall establish electrical utility elevations prior to fabrication and installation. The Electrical Contractor shall coordinate utility elevations with other trades. All

elevations shall be coordinated with all trades in the field prior to installation. When a conflict between trades arises, the design team shall be notified immediately prior to further installation however priority shall be as follows:

1. Lighting Fixtures
2. Gravity flow piping, including steam and condensate.
3. Electrical bus duct.
4. Sheet metal.
5. Cable trays, including access space.
6. Other piping.
7. Conduits and wireway.

1.21 DAILY HOUSEKEEPING AND CLEANING

- A. At the end of each workday, the contractor shall remove all of their debris, rubbish, tools, and surplus materials from the project work area. The work area shall be broom cleaned and left in a neat and orderly condition. The contractor shall not use the owner's waste disposal facility for the removal of debris from the project.
- B. At end of construction, all equipment shall be cleaned and the premises left in first class condition as far as this contractor's work is concerned.

1.22 ELECTRICAL UTILITY COMPANY

- A. Any fees by the utility company are to be billed directly to the owner.
- B. The contractor is required to assist the owner in the preparation of all utility company rebate forms that deal with equipment furnished and/or installed as a part of this contractor.

1.23 TELECOMMUNICATIONS UTILITY COMPANY

- A. Any fees by the telecommunications utility company are to be billed directly to the owner.
- B. The contractor shall be required to provide pathways to the property easement and/or right-of-way. Final Coordination of conduit routing and termination shall be performed by this contractor while communicating with each telecommunications utility company. This shall include telephone, cable television and internet services to the building.

1.24 WALL CONTINUITY (1 HR.)

- A. All items mounted in 1 hr. rated walls requiring an opening larger than a four inch (4") square (16 sq. inches) require the 1 hr. rating not be degraded.
- B. Any branch panel in a 1 hr. wall will require the exterior of the recessed panel be covered with 5/8 inch fire rated gypsum board. This is true for any device requiring more than a 16 sq. inch opening.

1.25 TRENCHING AND BACKFILLING

- A. Each contractor is responsible for their own individual trenching and backfilling unless otherwise noted in the drawings or addendum.
- B. All underground utilities, telephone conduit, parking lot lighting, tunnels, etc shall be exactly located prior to digging. This contractor shall be held responsible for all damages caused by failure to do so.
- C. Any backfill shall be tamped and compacted to prevent future settling. The backfill shall be installed to a smooth and level grade and installed in accordance with local codes.
- D. All excess dirt shall be cleared from the area and disposed of as directed by the owner.
- E. Refer to architectural specification sections for additional information.

1.26 LOW VOLTAGE CONDUIT INSTALLATION

- A. This contractor shall install conduit serving low voltage cables located in all mechanical rooms and non-accessible areas and exposed structural areas. Use cable trays in other areas as indicated on the drawings. Where cable trays are not accessible, use J-hooks equal to Caddy Cable CAT. Provide hooks with closure holes and cable ties. Mount hooks three foot (3') on center.

- B. This contractor shall install conduit sleeves serving low voltage cables through walls and floors.
- C. Refer to other specification sections for additional information.

1.27 VARIABLE FREQUENCY CONTROLLERS

- A. Refer to Specification Section 23 0913 DDC Instruments and Control Devices for HVAC and 23 2923 Variable Frequency Motor Controllers for additional information.
- B. This contractor is responsible for the installation of the VFD and all components, to include the reactors and any other separate items provided as part of the VFD package. Coordinate installation requirements with the FMS contractor.

1.28 TEMPORARY POWER AND LIGHTING

- A. Temporary electrical power and lighting necessary for the construction process is the responsibility of the electrical contractor and shall be included in the base bid amount.

1.29 EXTRA MATERIALS AND LABOR

- A. The electrical contractor shall include in their bid additional resources for the removal and installation of 10 existing junction boxes in order to maintain access upon completion of construction. Provide new wiring as necessary where length is insufficient to maintain a complete system. The relocation requests may occur anytime during the construction process as requested by the Owner or Design Team. Junction boxes may be associated with Divisions 26, 27 and 28.

1.30 DIGITAL MEDIA AGREEMENT

- A. Computer Aided Drafting (CAD) documents may be available to the contractor for some uses. Contact the engineer prior to bidding to determine what information is available to be transmitted to the contractor in digital form.
- B. When documents are determined to be available, and as requested by the contractor, they will be transmitted upon the completion and execution of the MODUS digital media agreement. A service fee for each document transmitted will be assessed to the contractor. Documents will be transmitted upon payment receipt. Current service fee is \$100.00 per CAD sheet.

1.31 SECURE NETWORKABLE DEVICES

- A. Update network devices to the most current software/firmware.
- B. Change default password of all networkable devices.
 - 1. Passwords shall have at least eight characters.
 - 2. Include uppercase and lowercase letters, numerals, and special characters
- C. Supply MAC address and serial number of all networkable devices.
- D. Work with the Owner's IT department to align to existing IT standards.
- E. Provide to the owner a printed and/or electronic spreadsheet log of all network information including, IP addresses, MAC addresses, logins and password information during system training.

1.32 SYSTEM CONFIGURATION AND PROGRAMMING FILES

- A. Supply system configuration and programming files where export is available.
- B. Supply uncompiled programming for systems applicable.
- C. All configuration and programming shall be property of the owner at conclusion of the project.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION 26 0050

SECTION 26 0090
MINOR ELECTRICAL DEMOLITION FOR REMODELING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. The requirements of the Contract Forms, the Conditions of the Contract, Division 1 - General Requirements and Specification Section 26 0050 - Basic Electrical Requirements "General Provisions" apply to this section.

1.02 SCOPE

- A. This contractor shall be responsible for the demolition and removal of all existing electrical elements within the project area except as follows:
 - 1. Elements shown on the drawings as "existing to remain and/or to be relocated".
 - 2. Elements serving adjacent areas.
 - 3. Elements required for the support of the newly remodeled areas.
- B. Preserve services to the existing facility. Extend, reroute, and reconnect existing systems as required providing for the continued function of these systems.
- C. Demolition shall be accomplished by the proper tools and equipment for the work to be removed. Personnel shall be experienced and qualified in the type of work to be performed.
- D. This electrical contractor shall remove all abandoned equipment, conduit, supports, equipment curbs and bases associated with the remodeled area unless noted otherwise.
- E. This contractor is responsible to provide temporary electrical protection during this project.

1.03 MATERIALS

- A. All elements to be removed are subject to the Owner's Right of Salvage.
- B. All materials removed shall be the property of the removing contractor and shall be removed from the site by them, unless otherwise specified.
- C. The owner may designate and have salvage rights to any material herein demolished by this contractor. It will be the owner's responsibility to designate such salvageable items and remove them prior to the contractor working in that area.

1.04 WORK BY OTHERS

- A. Unless specifically noted under other contracts, the electrical contractor shall assume they will perform all required work. In general, the following will be performed by others:
 - 1. The mechanical contractor shall be responsible for the cutting and capping of all existing gas, water, sewer, and any other utility service.

1.05 EXISTING CONDITIONS

- A. If any existing fixtures or devices that are to remain are disturbed by operations under this contract, the contractor is required to re-establish continuity of such systems.
- B. The electrical contractor shall arrange for the general contractor to repair and patch all construction with material necessary to match surrounding due to removal of equipment and conduit.
- C. The electrical contractor shall furnish all required labor and material, where required, to extend new work to connect to similar work for extension of existing systems.
- D. Demolition plans are based on casual field observations and existing record documents. Report discrepancies to the owner before disturbing existing installation. Beginning of demolition means installer accepts existing conditions.
- E. Floor slabs may contain conduit systems. This Contractor is responsible for taking any measures required to ensure no conduits or other services are damaged. This includes x-ray or similar non-destructive means. Where conduit is in concrete slab, cut conduit flush with floor, pull out conductors, and plug conduit ends.

- F. This Contractor is responsible for all costs incurred in repair, relocations, or replacement of any cables, conduits, or other services if damaged without proper investigation.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify field-circuiting arrangements and reconnect as necessary.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities. Reconnect circuits, as required, to prevent de-energizing of remaining receptacles and lights.
- C. Demolition drawings are based on casual field observation and existing record documents. Report discrepancies to the owner before disturbing existing installation.
- D. Beginning of demolition means installer accepts existing conditions.
- E. Review existing panels to remain in the area of construction. Notify the design team of any damaged circuit breakers or missing closure plates.
- F. Review existing lighting to remain in the area of construction. Notify the design team of any non-functional lamps, ballasts, or electrical parts.

3.02 PREPARATION

- A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal. Disconnect circuits at the source.
- B. Coordinate utility service outage with local utility company.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits use personnel experienced in such operations. This shall include 600 volt or less systems and low voltage signal circuits.
- D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchover connections. Obtain permission from the owner, at least 48 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections as required.
- E. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switch over and connections. Notify owner and local fire service at least 24 hours before partially or completely disabling the system. Minimize outage duration. Make temporary connections to maintain service within construction areas and in areas adjacent to work area.
- F. Existing Telephone System: Maintain existing system in service.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Demolish and extend existing electrical work under provisions of this section.
- B. Remove, relocate, and extend existing installations to accommodate new construction.
- C. Remove abandoned wiring to source of supply.
- D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors and patch surfaces.
- E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide a blank cover for abandoned outlets that have not been removed.
- F. Disconnect and remove abandoned panelboards and distribution equipment.
- G. Disconnect and remove electrical devices and equipment serving utilization removed equipment.

- H. Disconnect and remove abandoned luminaires, brackets, stems, hangers, and other accessories. This contractor shall include in their bid, associated fees for disposal of ballasts and lamps.
- I. Repair adjacent construction and finishes damaged during demolition and extension work.
- J. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
- K. Extend existing installation using materials and methods compatible with existing electrical installations or as specified.
- L. The electrical contractor is responsible for removal of lamps and ballast from existing fixtures to be demolished. The electrical contractor is to properly dispose of these items in accordance with codes for hazardous materials.

3.04 CLEANING AND REPAIR

- A. Clean and repair existing materials that remain or are to be reused.
- B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Provide typed circuit directory showing revised circuiting arrangement.
- C. Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry.

3.05 INSTALLATION

- A. Install relocated materials and equipment.

END OF SECTION 26 0090

SECTION 26 0519
ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Building wire
- B. Service entrance cable
- C. Wiring connectors

1.02 RELATED SECTIONS

- A. Specification Section 26 0553 - Identification for Electrical Systems
- B. Specification Section 26 2416 - Panelboards
- C. Specification Section 28 3100 - Fire Detection and Alarm

1.03 REFERENCES

- A. NECA Standard of Installation (National Electrical Contractors Association)
- B. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association)
- C. NFPA 70 - National Electrical Code
- D. Product Data: Provide for each cable assembly type.
- E. Test Reports: Indicate procedures and values obtained.
- F. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.
- G. NFPA 92B - Smoke Management for Malls, Atria, and Large Spaces
- H. IBC Section 909 - Smoke Control Systems

1.04 SUBMITTALS

- A. Project Record Documents: Record actual locations of components and circuits.
- B. Project Record Documents: Provide documentation of the manufacturer's recommended lug torque value for aluminum conductors, the date the lugs were torqued, and installed torque readings.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.07 PROJECT CONDITIONS

- A. Verify that field measurements are as indicated.
- B. Wire and cable routing indicated is approximate unless dimensioned. Include wire and cable lengths within 10 foot of length shown.

1.08 COORDINATION

- A. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.

PART 2 PRODUCTS

2.01 BUILDING WIRE

- A. Manufacturers:

1. Okanite
 2. Bell/Hubbell #BICC
 3. American Insulated Wire
 4. General Cable
 5. Southwire
 6. United Copper Industries
 7. Encore Wire Corporation
 8. Engineer approved equal.
- B. Description: Insulated conductor wire.
1. All wire shall be stranded. Refer to Section 26 0553 Identification for Electrical Systems for conductor color requirements.
 2. Provide solid wire pigtails at all wiring devices and lighting control devices.
- C. Conductor:
1. Copper
- D. Insulation Voltage Rating: 600 volts.
- E. Insulation: NFPA 70, type #THHN/THWN-2. All cable installation procedures or sizing shall be based on 75 deg C temperature rating.

2.02 SERVICE ENTRANCE CABLE

- A. Manufacturers:
- 1.
 2. Engineer approved equal.
- B. Description: NFPA 70, type #SE.
- C. Conductor: Copper.
- D. Insulation Voltage Rating: 600 volt.
- E. Insulation: Type #XHHW.

2.03 WIRING CONNECTORS

- A. Split Bolt Connectors:
1. Burndy
 2. Engineer approved equal.
- B. Spring Wire Connectors:
1. Thomas & Betts
 2. Engineer approved equal.
- C. Compression Connectors:
1. Burndy
 2. Thomas & Betts
 3. Engineer approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that mechanical work likely to damage wire and cable has been completed.
- C. Verify that raceway installation is complete and supported.

3.02 PREPARATION

- A. Completely and thoroughly swab raceway over two inch (2") in size or buried below grade before installing wire.

3.03 WIRING METHODS

- A. Concealed Dry Interior Locations: Use only building wire, type #THHN/THWN-2 insulation in raceway.

- B. Exposed Dry Interior Locations: Use only building wire, type #THHN/THWN-2 insulation in raceway.
- C. Above Accessible Ceilings: Use only building wire, type #THHN/THWN-2 insulation in raceway.
- D. Wet or Damp Interior Locations: Use only building wire, type #THHN/THWN-2 insulation in raceway.
- E. Exterior Locations: Use only building wire, type #THHN/THWN-2 insulation, in raceway. Use liquid-tight wiring methods. Use liquid-tight connections.
- F. Underground Installations: Use only building wire, type #THHN/THWN-2 insulation, in raceway. Use liquid-tight wiring methods.
- G. Interior Installations: Use only building wire, type #THHN/THWN-2 insulation, in raceway.
- H. Use wiring methods indicated.

3.04 INSTALLATION

- A. Route wire and cable as required meeting project conditions.
- B. Install cable in accordance with the NECA "Standard of Installation."
- C. Use stranded conductors for feeders and branch circuits larger than 12 AWG.
- D. Use conductors not smaller than 12 AWG for power and lighting circuits. Only pre-manufactured fixture whips are allowed to be 14 AWG.
- E. Use #10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.
- F. Use #10 AWG conductors for 20 ampere, 208/240 volt branch circuits longer than 200 feet.
- G. Use #10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 300 feet.
- H. Provide minimum #8 AWG wiring for exterior lighting and power circuits leaving building.
- I. It shall be the responsibility of the electrical contractor to verify all voltage drop and size all wire accordingly.
- J. Pull all conductors into raceway at same time.
- K. Use suitable wire pulling lubricant for building wire #4 AWG and larger.
- L. Protect exposed cable from damage.
- M. Use suitable cable fittings and connectors.
- N. Neatly train and lace wiring inside boxes, equipment and panel boards.
- O. Clean conductor surfaces before installing lugs and connectors.
- P. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- Q. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, #8 AWG and smaller.
- R. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, #10 AWG and smaller. All connections in exterior hand holes shall have liquidtight connections.
- S. Trench and backfill for direct burial cable installation. Install warning tape along entire length of direct burial cable within three inch (3") of grade.
- T. Identify and color code wire and cable under provisions of Specification Section 26 0553 - Identification for Electrical Systems. Identify each conductor with its circuit number or other designation indicated.
- U. Do not install multi-wire branch circuits. No sharing of neutral shall be permitted.
- V. Install all conductors and make final connections in accordance with all manufacturer's recommendations.
- W. Circuits indicated as 3-pole and having ECM motor loads shall include a neutral conductor.

3.05 FIELD QUALITY CONTROL

- A. Perform field inspection and testing.
- B. Inspect wire and cable for physical damage and proper connection.
- C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.
- D. Verify continuity of each branch circuit conductor.

END OF SECTION 26 0519

SECTION 26 0526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Rod electrode and conductors
- B. Mechanical connectors
- C. Wire
- D. Grounding well components
- E. Ground enhancement material

1.02 RELATED SECTIONS

- A. Specification Section 27 0526 - Grounding and Bonding for Communication Systems

1.03 SUBMITTALS

- A. Product data and manufacturer's installation instructions for non-approved manufacturers shall be submitted for review prior to the bid date.
- B. Submittals shall include:
 - 1. Dimensional drawing for each planned device.
 - 2. Exothermic Connection Certification for installers.

1.04 SUMMARY

- A. Provide all labor, materials, and equipment necessary to properly install a grounding system conductor in all new branch wiring and feeder installations, which shall be in full compliance with all applicable codes as accepted by the authorities having jurisdiction. The secondary distribution system shall include a grounding conductor in all raceways in addition to the return path of the metallic conduit.
- B. In general, all electrical equipment (metallic conduit, motor frames, panelboards, etc.) shall be bonded together with a green insulated or bare copper system grounding conductor in accordance with specific rules of Article 250 of the NEC and local codes. The bonding conductor through the raceway system shall be continuous from main switch ground bus to panel ground bar of each panelboard, and from panel grounding bar of each panelboard to branch circuit equipment and devices.
- C. All raceways shall have an insulated copper system ground conductor throughout the entire length of circuit installed within conduit in strict accordance with NEC. The grounding conductor shall be included in total conduit fill determining conduit sizes, even though not included or shown on drawings. All grounding conductors that run with feeders in PVC conduit outside of building shall be bare only.
- D. Provide and install all grounding and bonding as required by the National Electrical Code (NEC) including but not limited to Article 800 of the NEC.

1.05 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code
- B. NFPA 99 - Health Care Facilities
- C. The Joint Commission
- D. Iowa Administrative Code, Chapter 61
- E. IEEE 837-2014: Standard for Qualifying Permanent Connections Used in Substation Grounding
- F. IEEE Emerald Book
- G. IEEE Green Book

1.06 PROJECT RECORD DOCUMENTS

- A. Submit record documents to accurately record actual locations of grounding electrodes.

- B. Submit test results of each ground rod.

1.07 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.01 ROD ELECTRODE AND CONDUCTORS

- A. Material: Copper-clad steel.
- B. Diameter: 5/8 inch.
- C. Length: 10 feet (min). Increase number and/or lengths of ground rod electrodes as required to meet and achieve specified resistance.
- D. Maintain separation of not less than eight foot (8') and not more than 20 feet between ground rod electrodes.

2.02 MECHANICAL CONNECTORS

- A. All grounding connectors shall be in accordance with UL 467 and UL listed for use with rods, conductors, reinforcing bars, etc., as appropriate.
- B. Connectors and devices used in the grounding systems shall be fabricated of copper or bronze materials, and properly applied for their intended use. All connectors and devices shall be compatible with the surfaces being bonded and shall not cause galvanic corrosion by dissimilar metals.
- C. Lugs: Substantial construction, of cast copper or bronze with "ground" (micro-flat) surfaces, twin clamp, and two-hole tongue equal to Burndy QQA Series.
- D. Grounding and Bonding Bushings: Malleable iron.
 - 1. Manufacturers:
 - a. Thomas & Betts
 - b. Engineer approved equal.
- E. Piping Clamps: Burndy GAR-TC Series with a two-hole compression terminal.
- F. Grounding Screw and Pigtail: Raco #983.
- G. Building Structural Steel: Thompson #701 Series heavy duty bronze "C" clamp with two-bolt vise-grip cable clamp or equal.
- H. Mechanical lugs or wire terminals shall be used to bond ground wires together or to junction boxes and panel cabinets.

2.03 WIRE

- A. Material: Stranded copper.
- B. Size to meet NFPA 70 requirements as a minimum. Increase size if called for on drawings or in these specifications.
- C. Insulated THWN (or bare as noted elsewhere).

2.04 GROUNDING WELL COMPONENTS

- A. Well: 12"x12"x12" Eritech inspection well, Quazite box, or engineer approved equal.
- B. Well Cover: Bolt attachment, skid resistant with "GROUND" embossed on cover, suitable for designated traffic rating. Verify with engineer.
- C. Material: Polymer concrete with a minimum 10,000lb. load rating.
- D. Increase depth or size as required to provide proper access at installed location.

2.05 GROUNDING ENHANCEMENT MATERIAL

- A. Erico #GEM25A or engineer approved equal.

- B. Product shall meet IEC 62561-7.

PART 3 EXECUTION

3.01 GENERAL

- A. Install products in accordance with manufacturer's instructions.
- B. Install grounding electrodes conductor, bonding conductors, ground rods, etc. with all required accessories.
- C. Grounding shall meet (or exceed as required to meet these specifications) all the requirements of the N.E.C., the NFPA, and applicable standards of IEEE.
- D. Where there is a conflict between these specifications and the above applicable codes/standards or between this section of these specifications and other sections, then the most stringent or excessive requirement shall govern. Where there is an omission of a code/standard requirement in these specifications then the current code/standard requirements shall comply.
- E. Requirement in these specifications to comply with a specific code/standard article, etc. is not to be construed as deleting of requirements of other applicable codes/standards and their articles, etc.

3.02 GROUNDING ELECTRODES

- A. All connections shall be exothermic welded unless otherwise noted herein. All connections above grade and in accessible locations may be by exothermic clamping with devices UL listed as suitable for use except in locations where exothermic welding is specifically specified in these specifications or called for on drawings.
- B. Each rod shall be die stamped with identification of manufacturer and rod length.
- C. Install rod electrodes at locations indicated and/or as called for in these specifications.
- D. Ground Resistance:
 - 1. Main Electrical Service (to each building) and Generator Locations:
 - a. Grounding resistance measured at each main service electrode system and at each generator electrode system shall not exceed 5 ohms.
 - b. Other Locations:
 - 1) Resistance to ground of all non-current carrying metal parts shall not exceed 5 ohms measured at motors, panels, busses, cabinets, equipment racks, light poles, transformers, and other equipment.
 - 2) Resistance called for above shall be maximum resistance of each ground electrode prior to connection to grounding electrode conductor. Where ground electrode system being measured consists of two or more ground rod electrodes then the resistance specified above shall be the maximum resistance with two or more rods connected together but not connected to the grounding electrode conductor.
- E. Install additional rod electrodes as required to achieve specified resistance to ground (specified ground resistance is for each ground rod location prior to connection to ground electrode conductor).
 - 1. Provide grounding well with cover at each rod location. Install grounding well top flush with finished grade.
 - 2. Verify that final backfill and compaction has been completed before driving rod electrodes.
 - 3. Install ground rods not less than one foot (1') below grade level and not less than two feet (2') from structure foundation.

3.03 GROUNDING ELECTRODE CONDUCTOR

- A. Conductor shall be sized to meet or exceed the requirements of NEC 250 to meet these specifications and/or drawings.

3.04 GROUNDING CONDUCTORS

- A. Grounding conductors shall be provided with every circuit to meet (or exceed as required to meet these specifications and/or drawings) the requirements of NEC 250.
- B. At every voltage level, new portions of the electrical power distribution system shall be grounded with a dedicated copper conductor, which extends from termination back to power source in supply panelboard.
- C. Provide separate, insulated (bare if with feeder in PVC conduit outside of building) conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug.
- D. Except as otherwise indicated, each feeder raceway on the load side of the service entrance shall contain a ground conductor sized as indicated and where not shown shall be sized to meet (or exceed as required) these specifications and/or drawings the requirements of NEC 250. The conductor shall be connected to the equipment grounding bus in switchboards and panelboards, to the grounding bus in all motor control centers, and as specified to lighting fixtures, motors, and other types of equipment and outlets. The ground shall be in addition to the metallic raceway and shall be properly connected thereto, using a lug device located within each item enclosure at the point of electric power connections to permit convenient inspection.
- E. Provide green insulated ground wire for all receptacles and for equipment of all voltages. In addition to grounding strap connection to metallic outlet boxes, a supplemental grounding wire and screw equal to Raco No. 983 shall be provided to connect receptacle ground terminal to the box.
- F. All plug strips and metallic surface raceway shall contain a green insulation ground conductor from supply panel ground bus connected to grounding screw on each receptacle in strip and to strip channel. Conductor shall be continuous.
- G. Where integral grounding conductor is specified elsewhere in bus duct construction, provide equivalent capacity conductor from supply switchboard or panelboard grounding bus to the bus duct grounding conductor. Bond integral conductor to bus duct enclosure at each tap and each termination.
- H. All motors, all heating coil assemblies, and all building equipment requiring flexible connections shall have a green grounding conductor properly connected to the frames and extending continuously inside conduit with circuit conductors to the supply source bus with accepted connectors regardless of conduit size or type. This shall include food service equipment, laundry equipment, and all other "Equipment By Owner" to which an electric conduit is provided under this Division.

3.05 MAIN ELECTRICAL SERVICE

- A. Existing Buildings:
 - 1. The electrical contractor shall verify that each building's electrical service is properly grounded as required by the NEC.
 - 2. Provide and install electrical service grounding at each building as called for herein for all existing services that do not comply with the grounding specified above.
 - 3. Supplement existing electrical service grounding at each building as required to comply with all requirements in these specifications.
 - 4. If exterior ground rod electrode does not exist at each buildings main electrical service, provide and install these ground rods as called for main electrical service, exterior of building.
- B. Complete installation shall meet and exceed the requirements of the NEC 250.
- C. Artificial electrodes shall be provided for the main service in sufficient number and configuration to secure resistance specified.
- D. Bond To All Of The Following When Available On Site:
 - 1. Ground Rods.
 - 2. Metal Water Pipe (Interior and Exterior to Building)
 - 3. Building Metal Frame, Structural Steel and/or Reinforced Structural Concrete

4. All Piping Entering or Leaving All Buildings.
 5. Provide a main ground, bare copper conductor, sized per applicable table in NEC 250, but in no case less than #2/0, shall be run in conduit from the main switchgear of each building to the building steel in each respective building. Reference NEC 250.104 (c). This ground conductor shall also be run individually from the main switchgear and be bonded to the main water service ahead of any union in pipe and must be metal pipe of length as acceptable by authorities having jurisdiction. Provide properly sized bonding shunt around water meter and/or dielectric unions in the water pipe.
- E. Ground/bond neutral per NEC 250.
 - F. Provide and install ground bus bar on wall near main service disconnect/switchboard. Connect to ground bar in disconnect/switchboard bonded to switchboard/disconnect enclosure/neutral with copper grounding conductor sized per applicable table in NEC 250.

3.06 LIGHT FIXTURES

- A. All new and removed/reinstalled fixtures in building interior, and exterior fixtures shall be provided with green grounding conductor, solidly connected to unit. Individual fixture grounds shall be with lug to fixture body, generally located at point of electrical connection to the fixture unit.
- B. All suspended fixtures and those supplied through flexible metallic conduit shall have green ground conductor from outlet box to fixture. Cord connected fixtures shall contain a separate green ground conductor.
- C. Installation shall exceed minimum requirements of NFPA 780.

3.07 MISCELLANEOUS GROUNDING CONNECTIONS

- A. Provide bonding to meet regulatory requirements.
- B. Required connections to building steel shall be with UL accepted non-reversible crimp type ground lugs exothermically welded to bus bar that is either exothermically welded or bolted to steel in locations where weld will affect the structural properties of the steel. Required connections to existing building structural steel purlins/i beams shall be with heavy duty bronze "C" clamp with two bolt vise-grip cable clamp.
- C. Grounding conductors shall be so installed as to permit shortest and most direct path from equipment to ground; be installed in conduit; be bonded to conduit at both ends when conduit is metal; have connections accessible for inspection; and made with accepted solderless connectors brazed or bolted to the equipment or to be grounded; in NO case be a current carrying conductor; have a green jacket unless it is bare copper; be run in conduit with power and branch circuit conductors. The main grounding electrode conductor shall be exothermically welded to ground rods, water pipe, and building steel.
- D. All surfaces to which grounding connections are made shall be thoroughly cleaned to maximum conductive condition immediately before connections are made thereto. Metal rust proofing shall be removed at grounding contact surfaces, for 0 ohms by digital Vm. Exposed bare metal at the termination point shall be painted.
- E. All ground connections that are buried or in otherwise inaccessible locations, shall be welded exothermically. The weld shall provide a connection which shall not corrode or loosen and which shall be equal or larger in size than the conductors joined together. The connection shall have the same current carrying capacity as the largest conductor.
- F. Install ground bushings on all metal conduits entering enclosures where the continuity of grounding is broken between the conduit and enclosure (i.e. metal conduit stub-up into a motor control center enclosure or at ground bus bar). Provide an appropriately sized bond jumper from the ground bushing to the respective equipment ground bus or ground bus bar.
- G. Install ground bushings on all metal conduits where the continuity of grounding is broken between the conduit and the electrical distribution system (i.e. metal conduit stub-up from wall outlet box to ceiling space. Provide an appropriately sized bond jumper from the ground bushing to the respective equipment ground bus or ground bus bar.

- H. Each feeder metallic conduit shall be bonded at all discontinuities, including at switchboards and all sub distribution and branch circuit panels with conductors in accordance with applicable table in NEC 250 for parallel return with respective interior grounding conductor.
- I. Grounding provisions shall include double locknuts on all heavy wall conduits.
- J. Bond all metal parts of pole light fixtures to ground rod at base.
- K. Install grounding bus in all existing panelboards of remodeled areas, for connection of new grounding conductors, connected to an accepted ground point.
- L. Bond together reinforcing steel and metal accessories in pool and fountain structures.
- M. Where reinforced concrete is utilized for building grounding system, proper reinforced bonding shall be provided to secure low resistance to earth with "thermite" type devices, and #10AWG wire ties shall be provided to not less than ten full length rebars that contact the connected rebar.

3.08 GROUNDING BAR INSTALLATION

- A. Where indicated on the drawings, provide and install grounding bar/ground bus (bus bar). These bus installations are intended to provide a low-impedance "Earthing" path for surge voltages, which are electrically "clamped" and shunted to earth by variable-impedance surge protective devices. Metal sheaths of underground cables are also to be grounded thereto at points of building entrance.
- B. Mount bolt tapping lugs with hex head bolts to bus bar at two inch (2") on center spacing, one for each ground conductor.
- C. Mount bus bar to wall using two inch (2") polyester molded insulator stand-off.
- D. Extend a #2/0 (minimum size) or larger THWN insulated copper ground conductor (if larger size is called for on drawings or required by N.E.C. for service ground, etc.) in PVC conduit to accepted service ground installation or ground bus/bar in main service equipment enclosure.
- E. Extend #6 insulated copper ground wire from respective bus/bar to each 'local' ground bus/bar in each cabinet for the data and sound systems (if applicable).
- F. 'Systems' grounding bus/bar must be connected with #2/0 insulated copper conductor to grounding electrodes system as defined in NEC "Article 800-40(b).
- G. A separate grounding bar shall be installed in telecommunication rooms. Connect to the main electrical grounding bar with a #4/0 AWG grounding conductor in conduit.

3.09 TESTING AND REPORTS

- A. Raceway Continuity: Metallic raceway system as a component of the facilities ground system shall be tested for electrical continuity. Resistance to ground throughout the system shall not exceed specified limits.
- B. Ground resistance measurements shall be made on each system utilized in the project. The ground resistance measurements shall include building structural steel, driven grounding system, water pipe grounding system and other accepted systems as may be applicable. Ground resistance measurements shall be made in normally dry weather, not less than 24 hours after rainfall, and with the ground under test isolated from other grounds and equipment. Resistances measured shall not exceed specified limits.
- C. Upon completion of testing, the testing conditions and results shall be certified by the electrical contractor and submitted to the engineer.

3.10 INTERFACE WITH OTHER PRODUCTS

- A. Interface with communications system installed under other specification sections.

3.11 FIELD QUALITY CONTROL

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

- B. Use suitable test instrument with current certificate of calibration to measure resistance to ground of system. Perform testing in accordance with test instrument manufacturer's recommendations using the fall-of-potential method or signal injection method.

END OF SECTION 26 0526

SECTION 26 0529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Product requirements
- B. Formed steel channel
- C. Sleeves

1.02 REFERENCES

- A. NECA Standard of Installation (National Electrical Contractors Association)
- B. NFPA 70 - National Electrical Code

1.03 SUBMITTALS

- A. Product Data: Provide manufacturers catalog data for fastening systems.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of products.

1.04 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 PRODUCT REQUIREMENTS

- A. Materials and Finishes:
 - 1. Corrosion resistant.
 - 2. Select materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit, including weight of wire in conduit.
- B. Anchors and Fasteners:
 - 1. Concrete Structural Elements: Use expansion anchors and preset inserts.
 - 2. Steel Structural Elements: Use beam clamps and welded fasteners.
 - 3. Concrete Surfaces: Use self-drilling anchors and expansion anchors.
 - 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts and hollow wall fasteners.
 - 5. Solid Masonry Walls: Use expansion anchors and preset inserts.
 - 6. Sheet Metal: Use sheet metal screws.
 - 7. Wood Elements: Use wood screws.
- C. Staples:
 - 1. Wood Elements: UV resistant polyethylene saddles. For use with non-metallic sheathed cable only.

2.02 FORMED STEEL CHANNEL

- A. Manufacturers:
 - 1. Globe Strut
 - 2. Uni-Strut
 - 3. Kindorf
 - 4. Power-Strut
 - 5. Erico
 - 6. Engineer approved equal.
- B. Description: Galvanized steel.
- C. Provide aluminum supports and hangers in pool area and pool equipment room.

2.03 SLEEVES

- A. For conduits passing through wall, below grade, underground wall sleeves for conduits 4" or larger shall be continuous rigid steel. Seal with Linkseal, or engineer approved equal, at two diameters larger than conduit.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions and utility company regulations where applicable.
- B. Provide anchors, fasteners and supports in accordance with NECA "Standard of Installation".
 - 1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
 - 2. Do not use spring steel clips and clamps.
 - 3. Do not use powder-actuated anchors.
 - 4. Do not drill or cut structural members.
- C. Fabricate supports from structural steel or formed steel members or steel channel. Rigidly weld members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- D. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- E. Use steel channel supports to stand cabinets and panelboards one inch (1") off wall in all wet and damp locations.
- F. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.
- G. Reinforce outdoor concrete pads with 1/2 inch steel reinforcing bars on 12 inch centers or as shown on the drawings.
- H. All pathways and hangers shall be independently hung.

END OF SECTION 26 0529

SECTION 26 0533
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Conduit requirements
- B. Conduit types
- C. Box types
- D. Surface metal raceway types

1.02 REFERENCES

- A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated
- B. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated
- C. ANSI C80.5 - Rigid Aluminum Conduit
- D. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies
- E. ANSI/NFPA 70 - National Electrical Code
- F. NEMA 250 - Enclosures for Electric Equipment
- G. NEMA WD 6 - Wiring Device Configurations
- H. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
- I. NECA (National Electrical Contractor's Association) Standard of Installation
- J. NEMA WD 6 - Wiring Device Configurations
- K. TIA-569-B - Commercial Building Standard for Telecommunications Pathways and Spaces
- L. NEMA OS 2 – Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports; National Electrical Manufacturers Association; 2013 (ANSI/NEMA OS2)
- M. UL 514C- Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions

1.03 RELATED SECTIONS

- A. Specification Section 27 0526 - Grounding and Bonding for Communications Systems

1.04 PROJECT RECORD DOCUMENTS

- A. Accurately record actual routing of conduits larger than two inches.
- B. Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.

1.05 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.06 SUBMITTALS

- A. Product Data: Provide dimensions, knockout sizes and locations, materials, fabrication details, finishes, and accessories.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to the site.
- B. Accept products on site. Inspect for damage.
- C. Protect products from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

1.09 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on the drawings.
- B. Verify routing and termination locations of conduit prior to rough in.
- C. Conduit routing is shown on the drawings in approximate locations unless dimensioned. Route as required completing the wiring system.

PART 2 PRODUCTS

2.01 CONDUIT REQUIREMENTS

- A. Size conduit per ANSI/NFPA 70.
- B. Underground Installations:
 - 1. Within Five Feet (5') from Foundation Wall Including Below Building Slab: Use rigid steel conduit or schedule 80 PVC conduit.
 - 2. More Than Five Feet (5') from Foundation Wall: Use rigid steel conduit or schedule 80 PVC conduit.
 - 3. Where PVC conduit is utilized below slab, provide transition from PVC to rigid steel prior to elbow up and then as continuous rigid conduit through slab. No PVC conduits shall penetrate vertically through concrete slab.
 - 4. Minimum Size: One inch.
 - 5. Provide warning tape.
- C. Above Grade Outdoor Locations: Use rigid steel and aluminum conduit. Aluminum conduit shall not contact concrete mortar or block.
- D. Above Grade In or Under Slab:
 - 1. Use rigid steel conduit or schedule 80 PVC conduit.
 - 2. Maximum Size Conduit in Slab: Total of 50% of pour depth.
 - 3. Minimum Size: One inch.
 - 4. Where PVC conduit is utilized below slab, provide transition from PVC to rigid steel prior to elbow up and then as continuous rigid conduit through slab. No PVC conduits shall penetrate vertically through concrete slab. Unless PVC conduit is stalled below bottom-fed ground mounted equipment. PVC conduits may penetrate the slab as long as a box-out is provided in the slab to allow for conduit to pass through. Backfill box-out with pea gravel once conduits have been installed.
- E. Wet and Damp Locations:
 - 1. Use rigid steel conduit and intermediate metal conduit.
 - 2. Use aluminum conduit and fitting in pool and pool equipment room.
- F. Dry Locations:
 - 1. Concealed: Use rigid steel conduit, intermediate metal conduit or electrical metallic tubing.
 - 2. Exposed: Use rigid steel conduit, intermediate metal conduit or electrical metallic tubing.

2.02 CONDUIT TYPES

- A. Metal Conduit:
 - 1. Rigid Steel Conduit: ANSI C80.1
 - 2. Rigid Aluminum Conduit: ANSI C80.5

3. Intermediate Metal Conduit (IMC): Rigid steel
4. Fittings and Conduit Bodies: ANSI/NEMA FB 1; material to match conduit.
- B. Liquidtight Flexible Metal Conduit:
 1. Description: Interlocked steel construction with PVC jacket.
 2. Fittings: ANSI/NEMA FB 1.
- C. Electrical Metallic Tubing (EMT):
 1. Description: ANSI C80.3; galvanized tubing.
 2. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel setscrew fittings. Install compression type fittings in all wet and damp areas.
- D. Pre-manufactured Fixture Whips:
 1. Manufacturers:
 - a. Southwire
 - b. EPCO
 - c. Engineer approved equal.
 2. Description: UL listed flexible conduit with conductors and die-cast screw connectors on the end.
 3. Size: no longer than 6', 3/8" diameter.
 4. Wire: 14 AWG minimum for lighting and required by the load.
 5. Install between junction box and light fixture only in concealed and unfinished spaces. Use interior raceway or surface raceway where exposed in finished spaces.
- E. Fittings and Conduit Bodies:
 1. NEMA TC 3
 2. Install offsets at surface boxes.
 3. Install single hole strap connectors on all exposed conduit one inch (1") and smaller.

2.03 BOX TYPES

- A. General Requirements:
 1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 3. Provide a low voltage partition divider plate for applications where low voltage and line voltage circuits share the same outlet box.
- B. Outlet Boxes:
 1. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1, galvanized steel.
 - a. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported. Include 1/2 inch male fixture studs where required.
 - b. Concrete Ceiling Boxes: Concrete Type.
 2. Sheet Metal Communications Boxes: ANSI/NEMA OS 1, galvanized steel. Minimum of 4-11/16 inch square with a depth of 2-1/8 inch.
 - a. Refer to the drawings for plaster ring size/opening.
- C. Cast Boxes: NEMA FB 1, type #FD, cast alloy. Provide gasket cover by box manufacturer.
- D. Pull and Junction Boxes:
 1. Sheet Metal Boxes: NEMA OS 1 galvanized steel.
 2. Surface Mounted Cast Metal Box: NEMA 250, type #4 and #6, flat-flanged, surface mounted junction box:
 - a. Material: Galvanized cast iron.
 3. Cover: Furnish with ground flange, neoprene gasket and stainless steel cover screws.
 4. Fiberglass Hand Holes:
 - a. Die molded fiberglass hand holes.
 - b. Cable Entrance: Precut 6" x 6" cable entrance at center bottom of each side.
 - c. Cover: Fiberglass weatherproof cover with nonskid finish and light traffic rating.

2.04 SURFACE METAL RACEWAY TYPES

- A. Multi-Outlet or Wiring Assembly:
 - 1. Manufacturers:
 - a. Wiremold #2000
 - b. Engineer approved equal.
 - 2. Assembly: Sheet metal channel with fitted cover suitable for use as multi-outlet or wiring assembly.
 - 3. Size as indicated on the drawings.
 - 4. Receptacles: Provide covers and accessories to accept duplex receptacles. Receptacles, where indicated as plug mold, shall be spaced 18 inch on center. Install receptacles as indicated on the drawings. Match raceway finish.
 - 5. Channel Finish: Ivory scuff coat finish.
 - 6. Fittings: Furnish manufacturer's standard couplings, elbows, outlet and device boxes, and connectors.

PART 3 EXECUTION

3.01 CONDUIT INSTALLATION

- A. Install conduit in accordance with NECA "Standard of Installation."
- B. Arrange supports to prevent misalignment during wiring installation.
- C. Support conduit using coated steel, malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- D. Group related conduit support using conduit rack. Construct rack using steel channel and provide space on each for 25% additional conduits.
- E. Fasten conduit supports to building structure and surfaces.
- F. Do not support conduit with perforated pipe straps. Remove wire used for temporary supports.
- G. Do not use spring steel clips and clamps for support.
- H. Do not attach conduit to ceiling support wires.
- I. Arrange conduit to maintain headroom and present neat appearance.
- J. Route exposed conduit parallel and perpendicular to walls.
- K. Route conduit installed above accessible ceilings, parallel and perpendicular to walls.
- L. Route the conduit in and under slab from point-to-point.
- M. Do not cross conduits in slab.
- N. Maintain adequate clearance between conduit and piping.
- O. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degree F.
- P. Cut conduit square using saw or pipe cutter; de-burr cut ends.
- Q. Bring conduit to shoulder of fittings; fasten securely.
- R. Use conduit hubs to fasten conduit to cast boxes.
- S. A run of conduit shall not contain more than the equivalent of four (4) quarter bends (360 degrees), including those bends located immediately at the outlet or body. Use conduit bodies to make sharp changes in direction (as around beams). Use hydraulic one-shot bender to fabricate bends in metal conduit larger than two inch (2") size. All conduit shall be held right to structure.
- T. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- U. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.
- V. Provide suitable pull string in each empty conduit except sleeves and nipples.

- W. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- X. Ground and bond all conduits.
- Y. Identify conduit.
- Z. Use flexible and liquidtight conduits where required by NEC.
- AA. Flexible conduit up to six feet (6') in length can be used to connect mechanical equipment with motors, compressors, light fixtures or unless directed by engineer.
- AB. Install insulated bushings on all conduits and sleeves serving low voltage wiring prior to pulling wire unless otherwise noted.
- AC. Install grounded insulated bushings on all conduits and sleeves serving data wiring prior to pulling wire unless otherwise noted.
- AD. All low voltage conduits shall be sized to have less than 40% fill. Each penetration through a surface of any kind shall have a conduit sleeve with insulated bushings.
- AE. Junction boxes shall not be installed over four foot (4') above accessible ceiling without prior written approval by owner.
- AF. Conduits which enter communications entrance facilities shall extend 4 inches above the finished floor or 3 inches through the wall.
- AG. Minimum bend radius for communications conduits:
 - 1. For conduits 2" or less, maintain a minimum bend radius of (6) times the actual inside diameter of the conduit.
 - 2. For conduits greater than 2", maintain a minimum bend radius of (10) times the actual inside diameter of the conduit.
- AH. Communications conduits shall have no more than two (2) 90 degree bends between pull points and contain no continuous sections longer than 100 feet. Insert pull points or pull boxes for conduits exceeding 100 feet in length.
 - 1. A third bend is acceptable if:
 - a. The total run is not longer than (33) feet.
 - b. The conduit size is increased to the next trade size.
- AI. No continuous section of conduit may exceed 100 feet. Utilize pull boxes as necessary. Refer to the pull box execution section for more information.
- AJ. All wiring in the same conduit shall be from the same source and have the same voltage except where approved by the owner.
- AK. Exterior rooftop pathways shall be supported above roofing membrane utilizing rubber type support bases with 12 ga. galvanized channel supports (Copper B-Line Dura-Block or equivalent). Adjust height as necessary for compliance with NEC.
- AL. For conduit installed in precast concrete walls or floors, it shall be acceptable to utilize Schedule 40 PVC conduit in lieu of EMT.

3.02 BOX INSTALLATION

- A. Install boxes in accordance with NECA "Standard of Installation."
- B. Install electrical boxes in locations as shown on the drawings and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- C. Set wall mounted boxes at elevations to accommodate mounting heights as indicated.
- D. Electrical boxes are shown on the drawings in approximate locations unless dimensioned. Adjust box location up to ten foot (10') if required to accommodate intended purpose. Verify with architectural drawings and elevations for additional information.
- E. Orient boxes to accommodate wiring device orientation.
- F. Maintain headroom and present neat mechanical appearance.
- G. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only. Junction boxes shall not be installed over four foot (4') above accessible ceilings.

- H. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than six inches (6") from ceiling access panel or from removable recessed luminaire.
- I. Fire-stop boxes to preserve fire resistance rating of partitions and other elements. Boxes may be installed within a minimum of 24 inch separation with written approval prior to installation.
- J. Coordinate mounting heights and locations of outlets mounted above counters, benches, and back splashes.
- K. Locate outlet boxes to allow luminaires positioned as shown on the drawings. If light fixture locations conflict with ceiling plans, the electrical contractor shall document discrepancies and send to the engineer for clarification.
- L. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
- M. Use flush mounting outlet box in finished areas.
- N. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- O. Do not install flush mounting box back-to-back in wall, provide minimum six inch (6") separation.
- P. Provide minimum 24 inch separation for receptacles in acoustic rated walls. Provide sound blocking putty where lighting control devices are located in the same stud cavity.
- Q. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- R. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- S. Use adjustable steel channel fasteners for hung ceiling outlet box.
- T. Do not fasten boxes to ceiling support wires.
- U. Support boxes independently of conduit.
- V. Use gang box where more than one device is mounted together. Do not use sectional box.
- W. Use gang box with plaster ring for single device outlets.
- X. Use cast outlet box in exterior locations exposed to the weather and wet locations.
- Y. Use cast iron floor boxes for installation in slab on-grade, formed steel boxes are acceptable for other installations unless otherwise noted.
- Z. Set floor boxes level.
- AA. Large Pull Boxes: Use set screw enclosure in interior dry locations, surface-mounted cast metal box in other locations.
- AB. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- AC. Group devices associated with each other eight inches (8") on center (i.e. receptacle, data, voice outlet).
- AD. All floor mounted device locations shall have a dimensioned drawing from the Architect prior to installation.

3.03 PULLBOXES

- A. Size communications cabling pull boxes according to the following:

Conduit Trade Size	Width	Length	Depth	Width Increase for Additional Conduit
1"	4"	16"	3"	2"
1-1/4"	6"	20"	3"	3"
1-1/2"	8"	28"	4"	4"
2"	8"	36"	4"	5"
2-1/2"	10"	42"	5"	6"
3"	12"	48"	5"	6"

4"

16"

60"

8"

6"

- B. Directional changes within a pullbox shall not be allowed. Conduit entering the box shall have conduit leaving the box from the opposite side. Do not use a pull box to make 90 degree turns.
- C. Install pullboxes in conveniently accessible locations.
- D. Where identified on drawings as lockable, key all pullboxes the same.
- E. Label all pull boxes. Handwritten labels shall not be accepted.

3.04 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit using materials and method to preserve fire resistance rating of partitions and other elements.
- B. Piping and Ductwork: Route conduits through roof openings or through suitable roof jack with pitch pocket. Coordinate location with roofing installation specified.
- C. Coordinate installation of outlet and junction boxes for equipment connection.

3.05 ADJUSTING

- A. Adjust flush-mounting outlets to make front flush with finished wall material.
- B. Install knockout closures in unused box openings.
- C. Adjust floor box flush with finish flooring material.

3.06 CLEANING

- A. Clean interior of boxes to remove dust, debris, and other material.
- B. Clean exposed surfaces and restore finish.

END OF SECTION 26 0533

SECTION 26 0536
CABLE TRAYS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Basket type cable tray (CT-1)
- B. Thru-wall fire stop fittings

1.02 REFERENCES

- A. NFPA 70 - National Electrical Code
- B. ASTM A 123 - Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip
- C. ASTM A 525 - General Requirements for Steel Sheet, Zinc-Coated Galvanized by the Hot-Dip Process
- D. NEMA VE 1 - Metallic Cable Tray Systems

1.03 SUBMITTALS

- A. Product Data: Provide data for fittings and accessories.
- B. Shop Drawings: Indicate tray type, dimensions, support points, and finishes.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Project Record Documents: Record actual routing of cable tray and locations of supports.

1.04 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years experience and with service facilities within 100 miles of project.

1.05 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 BASKET TYPE CABLE TRAY (CT-1)

- A. Welded steel wire mesh cable tray. Electro plated zinc coated finish (12" W x 2" D).
 - 1. Cablofil CF ##
 - 2. Flextray
 - 3. Cat-Tray
 - 4. Engineer approved equal.
- B. Provide manufacturer's standard clamps, hangers, brackets, splice plates, connectors, and grounding straps.
- C. Install tray using a "C" bracket hung from the ceiling or fastened to the wall.
- D. Use tools authorized for installation.
- E. No copper data cabling is to be run in same space as coaxial television distribution, intercom or sound system.
- F. All basket tray is to maintain manufacturer approved fill capacities. Contractor shall adjust basket tray

2.02 THRU-WALL FIRE STOP FITTING

- A. Manufacturers:
 - 1. Specified Technologies #EZ-Path

2. Wiremold #FS2/4
 3. Hilti #CFS line
 4. Engineer approved equal.
- B. Thru-wall fire stop device for use in through-penetration fire stop system, examined and tested by Underwriters Laboratories Inc. to UL1479 and bears U.S. UL Classification Mark. Device shall be classified for use in one, two, three, and four-hour rated gypsum, concrete, and block walls and provided with a maximum "L" rating of 6 CFM.
- C. Box is to be constructed of 16 AWG G90 steel. Provide with adjustable doors.
- D. Provide with grounding lug. Maintain ground continuity through all devices.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install metallic cable tray in accordance with NEMA VE 1.
- B. Support trays in accordance with Specification Section 26 0529 - Hangers and Supports for Electrical Systems. Provide supports at each connection point, at the end of each run, and at other points as recommended by the manufacturer.
- C. Provide fire stopping under provisions to sustain ratings when passing cable tray through fire-rated elements.
- D. Ground and bond cable tray under provisions of Specification Section 26 0526 - Grounding and Bonding for Electrical Systems.
- E. Provide continuity between tray components.
- F. Use anti-oxidant compound to prepare aluminum contact surfaces before assembly.
- G. Provide #6 AWG bare copper equipment grounding conductor through entire length of tray; bond to each component.
- H. Connections to tray may be made using mechanical or exothermic connectors.
- I. Cable Tray installation shall be coordinated between all project trades. Provide cable tray offsets as required. If issues of coordination arise, project architect and engineer shall determine final use of ceiling space for all trades affected.

END OF SECTION 26 0536

SECTION 26 0553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates and labels
- B. Wire markers
- C. Underground warning tape
- D. Tracer wires
- E. Identification

1.02 REFERENCES

- A. NFPA 70 - National Electrical Code
- B. NFPA 70E - Standard for Electrical Safety in the Workplace

1.03 SUBMITTALS

- A. Product Data: Provide catalog data for nameplates, labels and markers.
- B. Samples: Submit two nameplates 4" x 4" in size illustrating materials and engraving quality.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.04 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 NAMEPLATES AND LABELS

- A. Nameplates:
 - 1. Normal power: Engraved three-layer laminated plastic white letters on black background.
- B. Locations:
 - 1. All electrical distribution and control equipment enclosure.
 - a. Switchboards and Panelboards: Line 1 shall state "Panel Name"; Line 2 shall state "Fed by Panel Name" as required by NEC section 408.4(B).
 - 2. Communication cabinets.
 - 3. Single mounted breaker.
 - 4. Fire alarm devices.
- C. Letter Size:
 - 1. Use 1/8 inch letters for identifying individual equipment and loads.
 - 2. Use 1/4 inch letters for identifying grouped equipment and loads.
 - 3. Use 1/4 inch letters for identifying communications cabinets, transfer switches and transformers.
- D. Labels: Embossed adhesive tape with 3/16 inch white letters on black background. Use only for identification of individual wall switches and receptacles, control device stations, and communication outlets.

2.02 WIRE MARKERS

- A. Description: Tape feeders to indicate phases.
- B. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.
- C. Legend:

1. Power and Lighting Circuits: Branch circuit or feeder number indicated.
2. Control Circuits: Control wire number indicated on schematic and interconnection diagrams.

2.03 UNDERGROUND WARNING TAPE

- A. Manufacturers:
 1. Seaton
 2. Engineer approved equal.
- B. Description: Plastic four inch (4") wide tape, detectable type, colored RED with suitable warning legend describing buried electrical lines and inscribed "CAUTION - ELECTRIC LINE BURIED BELOW".
- C. Location: Along length of each underground conduit.

2.04 TRACER WIRES

- A. The electrical contractor shall provide a solid #10 AWG Tracer wire in each below grade conduit serving the electrical and communication systems. Tracer wires shall be labeled at each location of accessibility.

2.05 IDENTIFICATION

- A. Identify All Junction Boxes With Appropriate Marker As Follows:
 1. 208 Volt System: Black (circuit name and number)
 2. Fire Alarm System: Red
- B. Write the circuit number of each device inside the device box (not ON the device cover). All receptacles and light switches (new and existing) shall have the final circuit number installed on each device cover with a nylon label. Coordinate exact requirements with the owner prior to installation.
- C. Temporary label all outlets and switches with circuit numbers.
- D. All receptacles capable of being powered by an emergency generator shall be identified with a red sticker 3/8 inch diameter with an adhesive back.
- E. Label all outlets and switches with an adhesive label identifying panel and circuit the device is energized by.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive nameplates and labels.

3.02 INSTALLATION

- A. Install nameplate and label parallel to equipment lines.
- B. Secure nameplate to equipment front using screws.
- C. Secure nameplate to inside surface of door on panelboard that is recessed in finished locations.
- D. Identify conduit using field painting.
- E. Paint colored band on each conduit longer than 6 feet.
- F. Paint bands 20 foot on center.
- G. Identify underground conduits or wiring using one underground warning tape per trench at three inch (3") below finished grade.

END OF SECTION 26 0553

SECTION 26 0943
DIGITAL LIGHTING CONTROL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Digital wall control
- B. Digital occupancy/vacancy sensors
- C. Digital daylighting sensors
- D. Digital room controllers
- E. Low voltage cables
- F. Emergency lighting control
- G. Wall face plates

1.02 RELATED SECTIONS

- A. Specification Section 26 0533 - Raceway and Boxes for Electrical Systems
- B. Specification Section 26 2726 - Wiring Devices
- C. Specification Section 26 5100 - Interior Lighting
- D. Specification Section 27 4100 - Audio-Visual Systems

1.03 REFERENCES

- A. NECA - Standard of Installation
- B. NEMA WD 1 - General Requirements for Wiring Devices
- C. NEMA WD 6 - Dimensional Requirements for Wiring Devices
- D. NFPA 70 - National Electrical Code
- E. UL 916 - Energy Management Equipment
- F. UL 924 - Standard for Emergency Lighting and Power Equipment

1.04 SUBMITTALS

- A. Product Data: Provide catalog data for nameplates, installation instructions, labels and markers, ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- C. Shop Drawings:
 - 1. Composite wiring and/or schematic diagram of each control circuit as proposed to be installed.
 - 2. Show exact location of all digital devices, including at minimum sensors, load controllers, and switches for each area on reflected ceiling plans.
 - 3. Provide room/area details including products and sequence of operation for each room or area. Illustrate typical acceptable room/area connection topologies and proof that the sensor is suitable for the proposed application.
 - 4. Network riser diagram including floor and building level details. Include network cable specification and end-of-line termination details, if required. Illustrate points of connection to integrated systems. Coordinate integration with mechanical and/or other trades.
 - 5. Product information sheets for all components and wiring provided. Include standard options for each product and color offerings.
 - 6. Submit manufacturer sensor coverage patterns applicable to this project. For areas requiring multiple sensor devices for appropriate coverage, submit specific manufacturer approved sensor layout as an overlay directly on the project drawings

- D. Closeout Submittals:
 - 1. Project Record Documents: Record actual installed locations and settings for lighting control devices.
 - 2. Operation and Maintenance Manual:
 - a. Include approved Shop Drawings and Product Data.
 - b. Include Sequence of Operation, identifying operation for each room or space.
 - c. Include manufacturer's maintenance information.
 - d. Operation and Maintenance Data: Include detailed information on device programming and setup.
 - e. Include startup and test reports.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum five years' experience.
- B. All room control devices and panels shall be provided with a five-year limited manufacturer's warranty, including one for one device replacement.

1.06 REGULATORY REQUIREMENTS

- A. Digital Lighting Management System shall accommodate the square-footage coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors, switches, daylighting sensors and accessories that suit the required lighting and electrical system parameters.
- B. Conform to requirements of NFPA 70.
- C. Provide products listed and classified by Underwriters Laboratories, Inc., as suitable for the purpose specified and indicated.
- D. System shall comply with FCC emission standards specified in part 15, sub-part J for commercial and residential application.

1.07 APPROVED MANUFACTURERS

- A. All equipment specified in this specification shall be manufactured by one of the below listed companies unless specified elsewhere. Model numbers stated in this specification are for basis of design information only.
 - 1. Digital Lighting Control Systems:
 - a. Hubbell Control Solutions - NX Series (Basis of Design)
 - b. Lutron
 - c. Crestron
 - d. Acuity Brands
 - e. Touché Lighting Controls
 - f. Wattstopper
 - g. Engineer approved equals.

1.08 SYSTEM TYPE

- A. System shall be wired.

PART 2 PRODUCTS

2.01 DIGITAL WALL CONTROL

- A. Refer to the lighting sequence of operations or schedule on the drawings for additional requirements.
- B. Low voltage momentary, self-configuring, digitally addressable pushbutton on/off.
 - 1. Basis of Design: Hubbell NX Series - Smart Switch
 - 2. Description: Fully addressable pushbutton switch with LED status indicators, up to 6 button configuration with on/off, raise/lower and dimming functionality in a single gang. Decorator style design.

3. Part of a digital lighting control system and can control any load(s) connected to room controller.
4. Load and Scene button function may be reconfigured for individual buttons from Load to Scene, and vice versa. Scene patterns may be saved to any button. Once set, buttons may be digitally locked to prevent overwriting of the preset levels.
5. Device shall have removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement shall be completed without removing the switch from the wall.
6. All digital parameter data programmed into an individual wall control shall be retained in non-volatile FLASH memory within the sensor itself. Memory shall have an expected life of no less than 10 years.

2.02 DIGITAL OCCUPANCY/VACANCY SENSORS

- A. Refer to the lighting sequence of operations or schedule on the drawings for additional requirements.
- B. Self-configuring, digitally addressable, calibrated wall or ceiling mounted; passive infrared (PIR), ultrasonic or dual technology.
 1. Sensors shall be able to be digitally calibrated in the field with the ability to adjust the sensitivity and time delay.
 2. Sensor shall be programmed to control specific loads within a local network. Devices shall be able to be assigned to a specific load within the room without wiring or special tools.
 3. Sensor shall have adjustable re-trigger time for all manual-on loads.
 4. All parameter data programmed into an individual occupancy sensor shall be retained in non-volatile FLASH memory within the sensor itself. Memory shall have an expected life of no less than 10 years.
 5. Wire all per manufacturer's recommendations.
 6. Wire multiple sensors serving the same area to operate as a single unit.
 7. Provide and install room controllers as required to obtain switching pattern shown on the drawings.
 8. Sensors shall have a time delay that is can be adjusted from 5 to 30 minutes, set in field.

2.03 DIGITAL DAYLIGHTING SENSORS

- A. Refer to drawings for schedule with basis of design information.
- B. Devices shall provide automatic switching, bi-level, or tri-level or dimming daylight harvesting capabilities for any load type connected to the controller or panel and include the following features:
 1. Switching photo sensors shall provide a field-selectable dead band, or a separation, between the "ON Setpoint" and the "OFF Setpoint" that will prevent the lights from cycling excessively after they turn off.
 2. Dimming photo sensors shall provide the option, when the daylight contribution is sufficient, of turning lights off or dimming lights to a field-selectable minimum level.
 3. Photo sensors shall have a digital, independently configurable fade rate for both increasing and decreasing light level in units of percent per second
 4. Photo sensors shall provide adjustable cut-off time. Cut-off time is defined by the number of selected minutes the load is at the minimum output before the load turns off. Selectable range between 0-240 minutes including option to never cut-off.
 5. All parameter data programmed into an individual occupancy sensor shall be retained in non-volatile FLASH memory within the sensor itself. Memory shall have an expected life of no less than 10 years.
 6. Provide accessories to accommodate multiple mounting methods and building materials. Photo sensors may be mounted on a ceiling tile, skylight light well, suspended lighting fixture or backbox.
 7. Any load or group of loads in the room may be assigned to a daylighting zone controlled by photo sensor.

- C. Closed loop sensors shall measure the ambient light in the space and control a single lighting zone and include the following features:
 - 1. An internal photodiode that measures light in a 100-degree angle, cutting off the unwanted light from bright sources outside of this cone.
 - 2. Automatic self-calibration, initiated from the photo sensor, a wireless configuration tool or a PC with appropriate software.
 - 3. Automatic creation of application-specific setpoints following self-calibration. For switching operation, an adequate dead band between the ON and OFF setpoints shall prevent the lights from cycling; for dimming operation a sliding setpoint control algorithm with separate Day and Night setpoints shall prevent abrupt ramping of loads.
- D. Open loop sensors shall measure incoming daylight in the space and capable of controlling multiple lighting zones and include the following features:
 - 1. An internal photodiode that measures light in a 60-degree angle (cutting off the unwanted light from the interior of the room).
 - 2. Automatic creation of application-specific setpoints following manual calibration using a wireless configuration tool or a PC with appropriate software. For switching operation, an adequate dead band between the ON and OFF setpoints for each zone shall prevent the lights from cycling; for dimming operation, a proportional control algorithm shall maintain the design lighting level in each zone.
 - 3. Each of the three discrete daylight zones can include any non-overlapping group of loads in the room.

2.04 DIGITAL ROOM CONTROLLERS

- A. Digital controllers for lighting zones and fixtures that automatically bind room loads to the connected control devices in the space without commissioning or the use of any tools. Provide controllers to match the room lighting and plug load control requirements.
- B. Devices shall automatically configure the room to the most energy-efficient sequence of operation based upon the devices in the room.
- C. Self-configuring, digitally addressable one, two or three relay plenum-rated controllers for on/off or selected dimming control.
 - 1. Basis of Design: Hubbell Control Solutions - NX Room Controller
 - 2. Controller shall match the room lighting sequence and control type requirements.
 - 3. Dual voltage (120/277 VAC, 60 Hz) capable rated for 20A total load
 - 4. Wire per manufacturer's recommendations.
 - 5. Based on individual configuration, each load shall be capable of the following behavior on power up following the loss of normal power: Turn on to 100 percent, turn off, turn on to last level.
 - 6. Dimming room controllers shall have options for 0-10 volt or line voltage forward phase control dimming outputs and integral current monitoring capabilities.
 - 7. Devices shall have a minimum of two RJ-45 local network ports.
 - 8. All parameter data programmed into an individual occupancy sensor shall be retained in non-volatile FLASH memory within the sensor itself. Memory shall have an expected life of no less than 10 years.
 - 9. Room controller shall be capable of being programmed through Bluetooth technology via a free app and via a local area connection.

2.05 LOW VOLTAGE CABLES

- A. Field-Terminated
 - 1. Digital room devices shall connect to the local network using field-terminated cables, which provide both data and power to room devices.
 - 2. Cable shall be plenum rated Cat 5e with RJ-45 connectors. Maximum cable run, and cable ratings shall meet manufacturer's requirements.
 - 3. Each field-terminated cable shall be tested following installation and testing results submitted to the Manufacturer's Representative for approval prior to proceeding with the work.

4. Low voltage wiring topology must comply with manufacturer's specifications.
5. Installing contractor shall meet all qualifications discussed in section 27 1005 - Telecommunications Cabling Infrastructure.

2.06 EMERGENCY LIGHTING CONTROL DEVICES

- A. UL 924 listed device that monitors a switched circuit providing normal lighting to an area. The unit provides normal ON/OFF control of emergency lighting along with the normal lighting. Upon normal power failure, the emergency lighting circuit will close, forcing the emergency lighting ON at 100% output until normal power is restored. Features include:
 1. Basis of Design: Hubbell Control Solutions - ALCR1277
 2. 120/277 volts, 50/60 Hz, 20-amp ballast rating
 3. Push to test button
 4. Auxiliary contact for remote test or fire alarm system interface
 5. Override dimming controls

2.07 WALL FACE PLATES

- A. Cover Plate:
 1. Basis of Design: Pass & Seymour #SS (Metal), to be confirmed by architect.
 2. Provide cover plate for all devices and provide multiple gang plates where required.
- B. Jumbo Cover Plate:
 1. Basis of Design: Pass & Seymour #SSO (Metal) to be confirmed by architect.
 2. Provide cover plate for all devices and provide multiple gang plates where required.
 3. Provide jumbo plates on masonry rough-in. Verify with architect prior to work being performed.

PART 3 EXECUTION

3.01 SAMPLES

- A. Upon request, electrical contractor is to provide a sample of any device specified in any available color.

3.02 COLOR

- A. All colors of devices, flanges, and faceplates shall be determined during the submittal process by the Architect. In the electrical bid, include any allowances needed to allow for selection of all cataloged colors.

3.03 EXAMINATION

- A. Verify that boxes are installed at proper height.
- B. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- C. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.04 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean debris from outlet boxes.

3.05 INSTALLATION

- A. Install in accordance with NECA "Standard of Installation."
- B. Install devices plumb and level.
- C. Low voltage wiring topology must comply with manufacturer's specifications
- D. All line voltage connections shall be tagged to indicate circuit and switched legs.
- E. Install wall plates on switches in finished areas.
- F. Test all devices to ensure proper communication.
- G. Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings. Adjust time delay so that controlled area remains lighted while occupied.

- H. All Class II cabling shall enter enclosures from within low-voltage wiring areas and shall remain within those areas. No Class I conductors shall enter a low-voltage area.
- I. Run separate neutrals for any phase dimmed branch load circuit. Different types of dimming loads shall have separate neutral.
- J. Furnish the Company's system which accommodates the square-footage coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors, switches, daylighting sensors and accessories which suit the lighting and electrical system parameters.
- K. Digital controllers for lighting and plug loads shall automatically bind the room loads to the connected devices in the space without commissioning or the use of any tools. Room and plug load controllers shall be provided to match the room lighting and plug load control requirements.
- L. Devices shall have status notification that indicates: data transmission, device power, load status and configuration status.
- M. Each load shall be capable of the following behavior on power up following the loss of normal power: turn on to 100%, turn off, turn on to last level.
- N. All devices installed above ceilings shall be UL 2043 plenum rated.
- O. All digital parameter data programmed into an individual room controller or plug load controller shall be retained in non-volatile FLASH memory within the controller itself. Memory shall have an expected life of no less than 10 years.
- P. Each dimming output channel shall have an independently configurable minimum and maximum calibration trim level to set the dimming range to match the true dynamic range of the connected ballast or driver.
- Q. Network signal integrity on low-voltage cables require that each conductor and ground wire be correctly terminated at every connected device.
- R. All low voltage cabling routed exposed in common and public areas shall be installed in EMT conduit. Coordinate final conduit routings with the Architect in the field during installation. Conduit installation shall meet all requirements listed in Section 26 0533 - Raceway and Boxes for Electrical Systems.

3.06 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations of outlet boxes provided under Specification Section 26 0533 - Raceway and Boxes for Electrical Systems to obtain mounting heights indicated on the drawings. Before roughing in any floor devices the electrical contractor shall obtain a dimensioned drawing signed by the owner showing device locations.
- B. Coordinate the placement of lighting control devices with millwork, furniture, equipment, door swings, etc. installed by others. Notify engineer of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.
- C. Coordinate requirements of A/V devices and shades that interface with lighting control system. Provide all required relays and connections required if they are controlled by the lighting control system.

3.07 OVERSIGHT AND COMMISSIONING

- A. At the start of construction, the contractor shall be responsible for organizing a pre-construction lighting controls meeting with contractor, manufacturer representative, owner, design team. The manufacturer rep shall provide samples of all products for review at this meeting.
- B. Supplier to verify layout of occupancy sensor devices during submittal process and all suggestions are to be brought to the engineer's attention immediately. After manufacturer's layouts have been approved, it shall be there responsibility of the manufacturer to ensure that the system operates per lighting control sequence as detailed on construction documents.
- C. Supplier is to give instructions to the electrical contractor for installation locations. Locations, shown on the drawings, are intended to provide device count for bidding. All placement must be per manufacturer's recommendations.

- D. Electrical contractor to install devices per manufacturer's layout. It shall be the responsibility of the contractor to verify that all quantities and device types are appropriate for space.
- E. Set IP addresses and other network settings of system front end hardware per facilities IT instructions.
- F. Supplier is to visit site, calibrate, and verify that the control of each space complies with the Sequence of Operation at substantial completion of building. Coordinate this meeting with project engineer.
- G. Supplier is to visit site and confirm proper operation of all automatic occupancy devices one month after owner occupancy. Supplier shall make modifications and calibrations as needed.
- H. Manufacturer shall provide the owner with one working configuration tool (device or app) with instructions on how to wireless facilitate customization of devices post occupancy.

3.08 LIGHTING CONTROL PANEL COMMISSIONING

- A. Supplier is to give instructions to the electrical contractor for installation and setup.
- B. Supplier is to visit site, calibrate, and verify proper operation of all lighting control panels at substantial completion of building. Coordinate this meeting with project engineer.
- C. Supplier is to visit site and confirm proper operation of all lighting control panels one month after owner occupancy. Supplier shall make modifications and calibrations as needed.

3.09 FIELD QUALITY CONTROL

- A. Inspect each wiring device for defects.
- B. Operate each wall switch with circuit energized and verify proper operation.
- C. Factory telephone support shall be available at no cost to the Owner following acceptance. Factory assistance shall consist of assistance in solving application issues pertaining to the control equipment.

3.10 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

3.11 CLEANING

- A. Clean exposed surfaces to remove splatters and restore finish.

3.12 EXTRA MATERIALS AND LABOR:

- A. The electrical contractor shall include in their bid an allowance to install an additional two wall control devices; two ceiling control devices; and room controllers including an average 50 feet of raceway, associated wiring, back box and labor, and all accessories required to energize each device requested. Device(s) may be added anytime during the construction process as requested by the owner or design team. Any unused devices shall be turned over to the owner at the final acceptance of building.

3.13 CLOSEOUT ACTIVITIES

- A. Owner Occupancy
 - 1. After 30 days from occupancy contractor shall adjust sensor time delays and sensitivities to meet the Owner's requirements. Provide a detailed report to the Owner of post start-up activity.
 - 2. Contractor shall be responsible for resetting self-learning devices that are designed to adapt to the normal use of the area of control. This should happen once the owner has full occupied the space and the areas are under normal occupancy.

END OF SECTION 26 0943

**SECTION 26 2726
WIRING DEVICES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duplex receptacles
- B. Ground fault circuit interrupting receptacles
- C. Simplex receptacles
- D. Wall plates

1.02 RELATED REQUIREMENTS

- A. Specification Section 26 0533 - Raceway and Boxes for Electrical Systems
- B. Specification Section 26 0943 - Digital Lighting Control Systems

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2010
- B. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; 1999 (R 2005)
- C. NEMA WD 6 - Wiring Device -- Dimensional Requirements; National Electrical Manufacturers Association; 2002 (R 2008)
- D. NFPA 70 - National Electrical Code; National Fire Protection Association; 2011
- E. UL Standard 943 - Standard for Safety for Ground-Fault Circuit Interrupters (GFCIs)

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
- C. Manufacturer's Installation Instructions.
 - 1. Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.
 - 2. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Wall Plates: One of each style, size, and finish.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Products: Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 DUPLEX RECEPTACLES

- A. Description
 - 1. Style: Hard use specification grade
 - 2. Device Body: Impact resistant plastic with impact-resistant nylon face. Auto-grounding strap.
 - 3. Configuration: NEMA WD 6, type as specified and indicated.
 - 4. Rating: Match branch circuit and load characteristics. Default rating is 5-20R, 125V, 20A.

5. Standards: Receptacles comply with NEMA WD 6 and WD 1.
6. Wiring: Back and side wire connections. Accepts #14-#10 AWG solid and stranded copper conductors.
7. Provide #12 AWG solid pigtails at each device. Splice to building wire within outlet box.
8. Color: Selected during submittal phase. Provide color chart upon request.

B. Types

1. Duplex Receptacles
 - a. Manufacturers:
 - 1) Pass & Seymour #5362
 - 2) Cooper #5362C
 - 3) Hubbell #5362
 - 4) Leviton #5362-S
 - b. Description: Traditional style, hard use specification grade duplex receptacle with wraparound grounding/mounting strap.
2. Tamper-Resistant Duplex Receptacles
 - a. Manufacturers:
 - 1) Pass & Seymour #TR5362
 - 2) Cooper #TRSGF
 - 3) Hubbell #HBL5362TR
 - 4) Leviton #5362-SG
 - b. Description: UL listed tamper-resistant receptacle with thermoplastic shutters.
 - c. Receptacles in all areas as noted in NEC Article 406.
3. Weather-Resistant Receptacles
 - a. Manufacturers:
 - 1) Pass & Seymour #2097TRWR
 - 2) Cooper #WRSGF20
 - 3) Hubbell #GFTWRST20
 - 4) Leviton #GFWT2
 - b. Description: UL listed weather-resistant receptacle.
 - c. Provide weather-resistant receptacles for all receptacles located in wet and damp locations as described in NEC Article 406.

2.02 GROUND FAULT CIRCUIT INTERRUPTING RECEPTACLES

- A. Receptacles: Complying with NEMA WD 6 and WD 1. Class A GFCI rated.
 1. Style: Hard use specification grade
 2. Device Body: Impact resistant plastic with impact-resistant nylon face. Auto-grounding strap.
 3. Configuration: NEMA WD 6, type as specified and indicated.
 4. Rating: Match branch circuit and load characteristics. Default rating is 5-20R, 125V, 20A.
 5. Standards: Receptacles comply with NEMA WD 6 and WD 1.
 6. Wiring: Back and side wire connections. Accepts #14-#10 AWG solid and stranded copper conductors.
 7. Provide #12 AWG solid pigtails at each device. Splice to building wire within outlet box.
 8. Color: Selected during submittal phase. Provide color chart upon request.
- B. Types
 1. GFCI Duplex Receptacles
 - a. Manufacturers:
 - 1) Pass & Seymour #2097
 - 2) Cooper SGF20
 - 3) Hubbell GFRST20
 - 4) Leviton GFNT2
 - b. Description: Specification grade duplex GFCI receptacle.
 - c. Receptacles noted as "GFI" on plans.
 2. GFCI Tamper Resistant Receptacles

- a. Manufacturers:
 - 1) Pass & Seymour 2097TR
 - 2) Cooper TRSGF20
 - 3) Hubbell GFTRST20
 - 4) Leviton GFTR2
- b. Description: Specification grade tamper-resistant duplex GFCI receptacle.
- c. Receptacles in all areas as noted in NEC Article 406.
- d. Receptacles noted as "GFI" on plans.

2.03 SIMPLEX RECEPTACLES

- A. Description
 1. Style: Hard use specification grade
 2. Device Body: Impact resistant plastic with impact-resistant nylon face. Auto-grounding strap.
 3. Configuration: NEMA WD 6, type as specified and indicated.
 4. Rating: Match branch circuit and load characteristics. Default rating is 5-20R, 125V, 20A.
 5. Standards: Receptacles comply with NEMA WD 6 and WD 1.
 6. Wiring: Back and side wire connections. Accepts #14-#10 AWG solid and stranded copper conductors.
 7. Provide #12 AWG solid pigtails at each device. Splice to building wire within outlet box.
 8. Color: Selected during submittal phase. Provide color chart upon request.

2.04 WALL PLATES

- A. Standard Cover Plates:
 1. Type 302 stainless steel cover plates. Cover plate style to be confirmed during submittal phase.
 2. Basis of Design: Pass & Seymour #SS (Metal), to be confirmed during submittal phase.
 3. Provide coverplate for all devices and provide multiple gang plates where required.
- B. Jumbo Cover Plates:
 1. Type 302 stainless steel oversize cover plates. Cover plate style to be confirmed during submittal phase.
 2. Basis of Design: Pass & Seymour #SSO (Metal) to be confirmed during submittal phase.
 3. Provide coverplate for all devices and provide multiple gang plates where required.
 4. Provide oversize plates on all masonry rough-ins. Verify with architect prior to work being performed.
- C. Weatherproof Box & Cover:
 1. Basis of Design: Pass & Seymour #WIUC10.
 - a. Description: Heavy-duty polycarbonate NEMA 3R "While-In-Use" weatherproof box and cover. Installed horizontally.
 - b. Complies with NEC Article 406 requirements for wet location covers.
 - c. Provide with plate kits as required.
 - d. Provide multi-gang or deep cover configurations as required for application.
 - e. Cover shall be capable of accepting a standard size padlock.
 - f. Color shall be gray, to be confirmed during submittal phase.
 - g. Indicated by "WP" on plans.
- D. Provide red plastic faceplates where powered by a redundant power supply, to be confirmed during submittal phase.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that outlet and switch boxes are installed at proper height.
- B. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- C. Verify that floor boxes are adjusted properly.

- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.02 PREPARATION

- A. Provide extension rings as needed to bring outlet and switch boxes flush with finished surface.
- B. Clean debris from outlet and switch boxes prior to device installation.

3.03 INSTALLATION

- A. Install securely, in a neat and workmanlike manner, as specified in NECA 1.
- B. Install devices plumb and level.
- C. Install switches with OFF position down.
- D. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
- E. Install receptacles with grounding pole on top.
- F. Connect wiring device grounding terminal to outlet box with bonding jumper.
- G. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
- H. Connect wiring devices by wrapping conductor around screw terminal.
- I. Use oversize plates for outlets installed in masonry walls.
- J. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
- K. The electrical contractor shall verify floor finish and location before ordering floor devices.
- L. The feeding of receptacles downstream of GFI receptacles for protection in lieu of providing multiple GFI receptacles is NOT allowed.

3.04 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations of outlet boxes provided under Section 26 0533 to obtain mounting heights specified.
- B. Install wall switches 48 inches above finished floor.
- C. Install convenience receptacle 18 inches above finished floor.
- D. Install above-counter convenience receptacle 6 inches above counter.
- E. Install telephone jack 18 inches above finished floor.
- F. In masonry walls, switches and receptacle heights shall be adjusted as required such that outlets are at nearest mortar joint to specified height.
- G. Coordinate the installation of wiring devices with underfloor duct service fittings provided under Section 26 0543.

3.05 FIELD QUALITY CONTROL

- A. Perform field inspection, testing, and adjusting in accordance with Section 01 4000.
- B. Inspect each wiring device for defects.
- C. Operate each wall switch with circuit energized and verify proper operation.
- D. Verify that each receptacle device is energized.
- E. Test each receptacle device for proper polarity.
- F. Test each GFCI receptacle device for proper operation.

3.06 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

3.07 CLEANING

- A. Clean exposed surfaces to remove splatters and restore finish.

3.08 EXTRA MATERIALS AND LABOR

- A. The electrical contractor shall include in their bid an allowance to install an additional two duplex receptacles including an average 50 feet of raceway, associated wiring, back box and labor, and all accessories required to energize each receptacle requested. Receptacle(s) may be added anytime during the construction process as requested by the owner or design team. Any unused devices shall be turned over to the owner at the final acceptance of building.

END OF SECTION 26 2726

SECTION 26 2816
ENCLOSED STARTERS AND SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Safety switches
- B. Motor-Rated starters and switches
- C. Automatic Controllers

1.02 RELATED REQUIREMENTS

- A. Specification Section 26 0529 - Hangers and Supports for Electrical Systems
- B. Specification Section 26 0553 - Identification for Electrical Systems

1.03 REFERENCE STANDARDS

- A. NEMA FU 1 - Low Voltage Cartridge Fuses; National Electrical Manufacturers Association
- B. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum); National Electrical Manufacturers Association
- C. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association
- D. NFPA 70 - National Electrical Code; National Fire Protection Association
- E. NECA - Standard of Installation (published by the National Electrical Contractors Association)

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide switch ratings and enclosure dimensions.
- C. Project Record Documents: Record actual locations of enclosed switches.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience and with service facilities within 100 miles of Project.
- C. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 SAFETY SWITCHES

- A. Manufacturers
 - 1. Square D
 - 2. General Electric
 - 3. Eaton
 - 4. Siemens
 - 5. Engineer approved equal.
 - 6. No engineer approved equal.
- B. Heavy duty safety switches shall be used for all motor loads over 1 HP and all non-motor loads 20 amps and greater.
 - 1. Nonfusible Switch Assemblies: NEMA KS 1, Type HD enclosed load interrupter knife switch.
 - a. Externally operable handle interlocked to prevent opening front cover with switch in ON position.
 - b. Handle lockable in OFF position.
 - 2. Enclosures: NEMA KS 1.

- a. Interior Dry Locations: Type 1 .
 - b. Exterior Locations: Type 3R.
 - c. Enclosures shall be provided with a method of opening the cover without opening the switch.
3. Enclosure shall include a grounding bar.

2.02 MOTOR-RATED STARTERS AND SWITCHES

- A. Manufacturers
1. Square D
 2. General Electric
 3. Cutler-Hammer
 4. Siemens
 5. Cooper-Bussmann
 6. Engineer approved equal.
- B. Motor-rated starters and switches may be used for all motor loads 1 HP and less and all non-motor loads under 20 amps.
1. Nonfusible Motor-Rated Starter
 - a. Basis of Design: Square D "Type F".
 - b. Description: Fractional horsepower manual starter with melting alloy type thermal overload relay.
 - c. Handle lockable in OFF position.
 - d. Current rating: 16A
 - e. For use with single-phase motors only.
 - f. Provide and install thermal units sized per NEC 430.
 2. Nonfusible Motor-Rated Switch
 - a. Basis of Design: Square D "Type K".
 - b. Description: Fractional horsepower manual switch with melting alloy type thermal overload relay.
 - c. Handle lockable in OFF position.
 - d. Current rating: 30A
 - e. For use with single or three phase motors.
- C. Motor-rated starters may be used for all motor loads 1 HP and greater.
1. Nonfusible Motor-Rated Starter
 - a. Basis of Design: Square D "M Type"
 - b. Description: Integral horsepower manual starter switch with melting alloy type thermal overload with auxiliary contact.
 - c. ON-OFF position
 - d. For use with single-phase or three phase motors or pumps only.
 - e. Provide and install thermal units sized per NEC 430.

2.03 AUTOMATIC CONTROLLERS

- A. Magnetic Motor Controllers: NEMA ICS 2, AC general-purpose Class A magnetic controller for induction motors rated in horsepower.
- B. Reversing Controllers: Include electrical interlock and integral time delay transition between FORWARD and REVERSE rotation.
- C. Two-Speed Controllers: Include integral time delay transition between FAST and SLOW speeds.
- D. Coil Operating Voltage: 120 volts, 60 Hertz.
- E. Overload Relay: NEMA ICS; bimetal.
- F. Enclosure: NEMA ICS 6, type as required to meet conditions of installation.
- G. Auxiliary Contacts: NEMA ICS 2, two each normally open contacts in addition to seal-in contact.
- H. Cover Mounted Pilot Devices: NEMA ICS 5, standard duty type.

- I. Pilot Device Contacts: NEMA ICS 5, Form Z, rated A150.
- J. Pushbuttons: Shrouded type.
- K. Indicating Lights: Transformer type.
- L. Selector Switches: Hand off/on/auto selector switch type.
- M. Relays: NEMA ICS 2.
- N. Control Power Transformers: 120 volt secondary in each motor starter. Provide fused secondary, and bond un-fused leg of secondary to enclosure.
- O. Electrical contractor shall provide this style motor starter for integrating into controls/BMS. Coordinate with the mechanical contractor.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with NECA "Standard of Installation."
- B. Install in accordance with manufacturer's instructions.
- C. Install plumb and provide in accordance with Specification Section 26 0529 - Hangers and Supports for Electrical Systems.
- D. Height to be five foot (5') to operating handle.
- E. Provide adhesive label with white letters on black background for associated equipment.

3.02 FIELD QUALITY CONTROL

- A. Perform field inspection in accordance with Section 01 4000.
- B. Inspect and test in accordance with NETA STD ATS, except Section 4.
- C. Perform inspections and tests listed in NETA STD ATS, Section 7.5.1.2.

END OF SECTION 26 2816

SECTION 26 5100
INTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. LED Drivers
- B. Light Emitting Diodes (LEDs)

1.02 REFERENCES

- A. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; 1994 (R 2003)
- B. NECA/IESNA 500 - Recommended Practice for Installing Indoor Commercial Lighting Systems; National Electrical Contractors Association
- C. NECA/IESNA 502 - Recommended Practice for Installing Industrial Lighting Systems; National Electrical Contractors Association
- D. NEMA WD 6 - Wiring Devices - Dimensional Requirements; National Electrical Manufacturers Association
- E. NFPA 70 - National Electrical Code; National Fire Protection Association
- F. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures; National Fire Protection Association
- G. IESNA LM-79-08 - Approved Method for the Electrical and Photometric Measurement of Solid-State Lighting Products
- H. IESNA LM-80-08 - Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- I. IESNA TM-21-11 - Projecting Long Term Lumen Maintenance of LED Light Sources
- J. EU Directive 2002/95/EC - Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS), as amended by directive 2005/618/EC

1.03 SUBMITTALS

- A. Provide cut sheet indicating dimensions and components for each luminaire.
- B. Submit manufacturer's installation instructions. Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- C. Submit manufacturer's operation and maintenance instructions for each product.
- D. All lighting submittals must be on Local Authorized Manufacturer Representative's letterhead and contain Project Name and Location.

1.04 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70 and NFPA 101.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.05 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70 and 101
- B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.
- C. Products with Light Emitting Diodes:
 - 1. Fixtures shall comply with LM-79-08: Electrical and Photometric Measurements of Solid-State Lighting Products.

2. Interior fixture diode arrays shall maintain +/-100 degrees Kelvin (K); exterior fixture diode arrays shall maintain +/- 500 K color temperature range through the life of the fixture.
3. Diode arrays shall be wired so that if one diode fails, at least 90% of the remaining diodes will operate.

PART 2 PRODUCTS

2.01 LED DRIVERS:

- A. Drivers shall be provided with light emitting diodes as a modular replaceable system. The system shall be fully designed and tested for operation throughout warranted period.
- B. Driver shall be Underwriters Laboratories (UL) listed, Class 2 Outdoor recognized.
- C. Driver shall be suitable for damp locations.
- D. Driver shall operate from -20 to 60 deg C.
- E. Refer to fixture schedule on drawings for additional requirements.
- F. Driver shall operate from 50 to 60 Hz input source of 120 V, 208 V, 240V, 277 V and/or 480 V, as required in plans, with sustained variations of +/-10% (voltage and frequency) with no damage to the driver.
- G. Driver output shall be regulated to +/- 5% across published load range.
- H. Driver shall have an "A" sound rating.
- I. Driver shall have a power factor greater than 0.9.
- J. Driver input current shall have Total Harmonic Distortion (THD) of less than +/-20% at all operating voltages.
- K. Driver shall tolerate sustained open circuit and short circuit output conditions without damage and without need for external fuses or trip devices.
- L. Driver shall carry a five-year warranty from the date of manufacture against defects in material or workmanship, including replacement for operation at a maximum case temperature of 90 deg C.
- M. Driver shall have an efficiency greater than or equal to 85%.
- N. Driver shall comply with Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 15, Non-consumer (Class A) for EMI/RFI (conductive and radiated).
- O. Driver shall not contain any Polychlorinated Biphenyl (PCB).

2.02 LIGHT EMITTING DIODES (LEDS):

- A. Light Emitting Diodes shall be provided with a driver as a modular replaceable system. The system shall be fully designed and tested for operation throughout warranted period.
- B. Diode arrays shall maintain +/-100K color temperature through the life of the fixture.
- C. Diodes shall have a minimum color rendering index of 78.
- D. Diodes and associate circuitry shall be RoHS compliant.
- E. Diodes shall be photometrically tested for compliance with IESNA LM-80-08, with projections calculated in accordance with IESNA TM-21-11.
- F. Diode arrays shall maintain 70% lumen output through an average operating life of 50,000 hours.
- G. Diodes and associated printed circuit boards shall be RoHS compliant.
- H. Refer to Lighting Fixture Schedule for color temperature requirements.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Furnish products as specified in schedule on the drawings.

- C. Install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendant length required suspending luminaire at indicated height.
- D. Locate recessed ceiling luminaires as indicated on reflected ceiling drawing and electrical lighting drawings.
- E. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- F. Install recessed luminaires to permit removal from below.
- G. Install recessed luminaires using accessories and fire stopping materials to meet regulatory requirements for fire rating.
- H. Install clips to secure recessed grid-supported luminaires in place.
- I. Install recessed can luminaires to fit in ceiling. Provide all necessary trim ring extenders or other accessories for proper installation of luminaire in ceiling.
- J. Install wall mounted luminaires, emergency lighting units and exit signs at height as scheduled.
- K. Install accessories furnished with each luminaire.
- L. Fixture whips utilizing THHN/THWN-2 wire in flexible metal conduit shall be used to connect all luminaires, emergency lights, and exit signs. Minimum wire size for all fixture whips shall be 14 AWG. Fixture whips shall be wired directly from the luminaire to an accessible junction box. Fixture to fixture whips are not allowed. Maximum length for any fixture whip shall be 6'.
- M. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- N. Bond products and metal accessories to the branch circuit equipment grounding conductor.
- O. Exposed Grid Ceilings: Support surface mounted luminaires on grid ceiling directly from building structure. Provide auxiliary members spanning ceiling grid members to support surface mounted luminaires.
- P. Support luminaires larger than 2' x 4' size independent of ceiling framing.

3.02 FIELD QUALITY CONTROL

- A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.03 ADJUSTING

- A. Aim and adjust luminaires as directed.
- B. Position exit sign directional arrows as indicated.

3.04 WARRANTIES

- A. All warranties shall remain as an agreement between the installing contractor and the manufacturer. No third parties shall be involved with warranty repairs or replacements of installed products without the written consent of the installing contractor and the owner or their representative.
- B. Labor for warranty repairs shall be billed by the contractor directly to the manufacturer or distributor during the duration of the labor warranty on the originally installed products. Labor work required on warranted parts, but outside of the 1-year labor warranty shall be the responsibility of the owner.

3.05 CLEANING

- A. Clean all electrical parts to remove all of the conductive and deleterious materials.
- B. Remove dirt and debris from enclosures.
- C. Clean photometric control surfaces as recommended by manufacturer.
- D. Clean finishes and touch up damage.

3.06 SCHEDULES

- A. See the drawings.

3.07 EXTRA MATERIAL AND LABOR

- A. The electrical contractor shall include in their bid an allowance to install an additional two emergency lights and two emergency exit signs of each type as scheduled including an average 50 feet of raceway, associated wiring, back box and labor, and all accessories required to energize each device requested. Fixture(s) may be added anytime during the construction process as requested by the owner or design team. See schedule on drawings for types. Any materials that are not used during construction shall be turned over to the owner at the final acceptance of the building.
- B. Drivers:
 - 1. The electrical contractor shall include in their bid, two (2) additional drivers for all wattages, voltages, and configurations required on the project.
 - 2. Extra materials shall be turned over to the owner at substantial completion in their original unopened packaging.
 - 3. All drivers shall be clearly marked for the fixture types that they are compatible with based on the drawings, fixture schedule and submittals received.
 - 4. Extra drivers included in this requirement shall not be used for warranty replacements without replacing this extra stock in the owner's inventory.
 - 5. No labor should be added to the project over the standard warranties already required in previous sections.

END OF SECTION 26 5100

SECTION 26 5200
EMERGENCY LIGHTING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Emergency ballasts and drivers

1.02 RELATED SECTIONS

- A. Specification Section 26 0943 - Digital Lighting Control Systems
- B. Specification Section 26 5100 - Interior Lighting

1.03 REFERENCES

- A. NFPA 101 - Life Safety
- B. NFPA 70 - National Electrical Code
- C. UL 924 - Standards for Emergency Lighting & Power Equipment
- D. NEMA 410 - Performance Testing for Lighting Controls & Switching Devices

1.04 SUBMITTALS

- A. Shop Drawings: Indicate dimensions and components for each physical component.
- B. Wiring Diagram: Submit a wiring diagram from the manufacturer showing wire size, wire type, and proposed routing within the building between all components of the system.
- C. Product Data: Provide dimensions, ratings and performance data.
- D. Submit manufacturer's installation instructions. Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation and installation of product.
- E. Submit manufacturer's operation and maintenance instructions for each product.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the emergency lighting products specified in this section with minimum five years of experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 101 and NFPA 70.
- B. All electronic drivers and discharge ballasts shall be provided to satisfy and conform to the in-rush requirements of NEMA 410.
- C. Products: Listed and labeled as required by Underwriter's Laboratories Standard for Safety UL 924, Emergency Lighting and Power Equipment, as suitable for the purpose specified and indicated.

1.07 WARRANTY

- A. The manufacturer shall warrant the emergency lighting inverter for a period of 12 months after Substantial Completion. Provide 10 year pro-rated warranty on battery, pro-rated after first year on straight line basis.
- B. Emergency ballasts and drivers shall have a full five (5) year, non-prorated warranty.
- C. Include coverage of travel, labor, parts and service.

1.08 PREINSTALLATION MEETING

- A. The contractor shall schedule a pre-installation meeting with the manufacturer or manufacturer's representative prior to the installation of any systems or components.

PART 2 PRODUCTS

2.01 EMERGENCY BALLASTS AND DRIVERS

- A. Manufacturers
 - 1. Philips/Bodine
 - 2. Dual-Lite
 - 3. Iota
 - 4. Engineer approved equal.
- B. Emergency drivers - Light Emitting Diodes
 - 1. Unit: Self-contained, with automatic transfer to battery supply on loss of normal power, UL 924 listed for factory or field installation in indoor and damp locations.
 - 2. Battery: Sealed, high temperature, maintenance free, nickel cadmium battery with capacity to provide 90 minutes of emergency operation, with 24-hour recharge time, seven (7) year minimum battery life expectancy.
 - 3. Features: Integral battery charger with LED charging indicator light, test switch, and electronic circuitry for use with LED drivers.
 - 4. Driver shall be mounted integral or adjacent to luminaire or where shown on drawings. Driver shall be accessible from below ceiling through luminaire opening.
 - 5. Drivers for light fixtures installed in an exterior location or in a location that is open to the elements shall be rated for cold weather use.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install emergency lighting inverter(s) plumb and level with required clearances.
- C. Provide interconnection between cabinets.
- D. Connect all emergency lighting units, exit signs and light fixtures designated for emergency use with unswitched hot conductor from the nearest electrical power circuit.
- E. Locate test switches integral to light fixture(s) when possible.
- F. Coordinate remote test switch locations with design team prior to installation.
- G. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- H. Bond products and metal accessories to the branch circuit equipment grounding conductor.

3.02 FIELD QUALITY CONTROL

- A. Operate each luminaire after installation and connection. Inspect for proper connection and operation to satisfy NFPA 101 requirements.
- B. Include services for emergency lighting inverter technician to supervise adjustments, final connections, and system start-up.

3.03 CLEANING

- A. Clean all electrical parts to remove all of the conductive and deleterious materials.
- B. Remove dirt and debris from enclosures.
- C. Clean photometric control surfaces as recommended by manufacturer.
- D. Clean finishes and touch up damage.

END OF SECTION 26 5200

SECTION 27 0050
BASIC COMMUNICATIONS REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Basic Communications Requirements specifically applicable to Electrical Division Specification Sections.
- B. Division 27 Specification requirements also include, by reference, all Division 00 and 01 specification sections. This contractor is responsible to review these specification sections. Requirements of these specification sections are included as a part of this contract.
- C. Division 27 Specification requirements also include, by reference, Specification Section 08 7100 - Door Hardware. Review and inclusion of the electrical requirements of this specification section are included as a part of this contract.

1.02 WORK BY OWNER

- A. The Following Work or Sub Contracts Will Be Supplied and Furnished By The Owner:
 - 1. All active network equipment, phones, and computers shall be furnished and installed by owner unless specified otherwise. Contractor shall coordinate time lines with state and county on telecom room and network drop installation.
 - 2. Contractor shall coordinate with Technicom Communications Systems (319-364-3800) for coordination in relocating phone systems.
- B. The Following Products Will Be Furnished By The Owner:
 - 1. Wireless Access points shall be provided by owner and installed by contractor.
 - 2. Valcom paging equipment is existing and shall be relocated by contractor as part of this project.
 - 3. County telecom rack shall be furnished by owner and contractor installed.
- C. Owner's Responsibility:
 - 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.
- D. Contractor's Responsibility:
 - 1. Review owner reviewed shop drawings, product data and samples.
 - 2. Review and unload owner purchased materials at site, inspect for completeness and/or damage jointly with the owner.
 - 3. Handle, store, install and finish products. Install electrical wiring and devices.
 - 4. Repair and/or replace items damaged after receipt.

1.03 OWNER OCCUPANCY

- A. The owner will occupy the premises during the construction period.
- B. Limit use of site and premises to allow owner occupancy.
- C. Cooperate with the owner to minimize conflict and to facilitate owner's operations.
- D. Schedule the work to accommodate this requirement.

1.04 REGULATORY REQUIREMENTS

- A. This contractor shall give proper authorities all requisite notices relating to work in their charge, obtain official permits, licenses for temporary construction and pay proper fees for it.
- B. This contractor is to be solely answerable for and shall promptly make good all damage, injury or delay to other contractors, to neighboring premises or to persons or property of the public by themselves, by their employees or through any operation under their charge, whether in the contract or extra work.

- C. No attempt has been made to reproduce in these specifications any of the rules or regulations contained in city, state or federal ordinances and codes pertaining to the work covered by these specifications that the contractor be thoroughly familiar with all such ordinances and codes.
- D. The fact that said various rules, regulations and ordinances are not repeated in this specification does not relieve the contractor of the responsibility of making the entire installation in accordance with the requirement of those authorities having jurisdiction.
- E. All work shall comply with the applicable recommendations of:
 - 1. National Board of Fire Underwriters
 - 2. ANSI-NFPA 70 National Electrical Code
 - 3. National Fire Protection Association (NFPA)
 - 4. Occupations Safety and Health Act (OSHA)
 - 5. IBC Building Code (current) and any current applicable city building and or electrical codes.
 - 6. Fire Protection: Conform to International Fire Code (IFC) and NFPA
 - 7. International Energy Conservation Code (IECC)
 - 8. The Joint Commission
 - 9. Iowa Administrative Code, Chapter 61
- F. Obtain permits and request inspections from authority having jurisdiction.
- G. Conform to latest approved versions of codes.

1.05 PROJECT/SITE CONDITIONS

- A. Install work in locations shown on drawings unless prevented by project conditions.
- B. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to work specified in other sections. Obtain permission of owner and architect/engineer before proceeding.
- C. This contractor shall, before submitting their bid, visit the site of the project to familiarize themselves with locations and conditions affecting their work.
- D. It is the intent of this specification that the contractor furnishes all labor and material required to complete the installation as outlined in the drawings and specifications. No additions to the contract price shall be allowed due to the failure of this contractor to properly evaluate the effect of existing conditions on the work to be done under this contract.
- E. Whenever renovation or remodeling or relocation of existing equipment is included in the contract, it is imperative that all locations of existing wiring conduits, electrical panels, equipment, services and grades be noted on the job site before bid is submitted and that all elevations and grades be verified before roughing in new work.
- F. This contractor shall provide holes as necessary for the installation of their work and in accordance with materials other than the structure.

1.06 SEQUENCING AND SCHEDULING

- A. This contractor shall arrange their work in order that it progresses along with the general construction of the building.
- B. This contractor shall be kept informed as to the work of other trades engaged in this project and shall execute their work in such a manner so as not to delay or interfere with progress of other contractors.
- C. Where space for electrical lines and conduit is limited, it is imperative that all such trades coordinate their work so as to ensure concealment in space provided. Where conflict exists, the design team shall decide priority of space. If work is not properly coordinated, the design team may require removal and relocation of work without additional compensation.

1.07 GUARANTEE

- A. This contractor shall guarantee all of the apparatus, materials, equipment furnished and labor installed under this contract for a period of one year after date of final acceptance, unless a longer period is specified.

- B. Neither final certificate of payment nor any provisions in the contract documents nor partial or complete occupancy of premises by owner shall constitute an acceptance for work not done in accordance with contract documents or relieve the contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship.
- C. Should any defects arise as the result of defective workmanship or material within the guarantee period set forth, this contractor shall make the necessary correction at their own expense.

1.08 ENGINEER APPROVED EQUAL PRODUCTS

- A. When the engineer, at the request of the interested parties, including the contractor, supplier and manufacturer approved "engineer approved equal" products for this project, such products are approved on the assumption that they will equal or exceed the performance of the products specified.
- B. If such products do not do so after being installed on this project, this contractor shall replace or modify the particular product as necessary to equal the performance of the products specified at no expense to the owner, architect or engineer.
- C. Request for "engineer approved equal" products shall be received by the architect/engineer prior to the last addendum being issued. Requests for substitutions received after this date will not be considered. Substitution requests shall clearly state which products are being considered for substitution. Substitution requests shall include all pertinent product information needed to evaluate the substitution as an "equal".
- D. Similar products shall be all of the same manufacturer and style. There is no exception to this unless prior approval has been granted from engineer.

1.09 OWNER'S RIGHT OF SALVAGE

- A. Before beginning construction, the contractor shall check and verify with the owner each item of existing equipment that must be removed.
- B. The owner will designate which items of material or equipment not reused that he may wish to keep. The contractor shall then remove these items with care and store in a location designated by the owner for the owner's disposal.
- C. All other items of equipment to be removed and not specified for reuse in new construction or reserved by the owner for their use shall become the property of the contractor and shall be removed from the site.

1.10 TELECOMMUNICATIONS UTILITY COMPANY

- A. The contractor is required to assist in coordination of final telecommunications utility locations that will serve the building with telephone, internet and cable television services. See 26 0050 for additional information.

1.11 PROTECTION AND MAINTENANCE

- A. The work covered by these drawings and specifications involves all work in the existing building.
- B. Where necessary to connect to any existing utility service, this electrical contractor shall contact the owner and shall coordinate any building service connection with the owner so that normal operation to the building is disrupted as little as possible.
- C. Any work to be done in existing structures shall be coordinated with the owner and arrangements made so that traffic flow may be maintained and areas finished where possible before other areas are begun.
- D. This contractor shall protect existing equipment in finished areas from dirt, dust, and damage as a result of their work.
- E. Coordinate protection requirements with department heads before beginning construction.
- F. Protect any building openings from unauthorized entry. Coordinate with owner where building entry must be controlled.

1.12 DEMOLITION

- A. This contractor shall be responsible for the demolition and removal of all existing system elements within the project area except as follows:
 - 1. Elements shown on the drawings as "existing to remain and/or to be reused".
 - 2. Elements serving adjacent areas.
 - 3. Elements required for the support of the newly remodeled areas.
 - 4. All elements to be removed are subject to the Owner's Right of Salvage.
- B. Preserve services to the existing facility. Extend/reroute/reconnect the existing systems as required providing for the continued function of these systems.

1.13 CUTTING AND PATCHING

- A. This contractor shall do all cutting and patching necessary for the installation of their work in all existing and new buildings unless otherwise noted.
- B. In areas where the integrity of fire separation assembly/wall is compromised by the work, this contractor shall be responsible to patch and/or seal openings as necessary to maintain and/or return fire separation to rating as required by applicable codes.
- C. This contractor shall do all cutting and patching required for their work beyond the remodeled areas unless otherwise noted. All finish work shall include patching to match existing adjacent surfaces. Painting shall be by others.

1.14 CLEANING AND RUBBISH

- A. This contractor, upon completion of their work, shall remove all rubbish and debris resulting from their operation and shall remove it from site at their own expense.
- B. As far as their work is concerned, all equipment shall be cleaned and the premises left in first class condition.
- C. This contractor shall maintain the work area each day to prevent hazardous accumulation of debris from their work.

1.15 SEALING AND PENETRATION

- A. Clearance around the piping passing through fire or smoke rated construction shall be sealed to maintain the rated integrity of the construction (1 hr. 2 hrs. etc.). One and two-hour rated assemblies are to be patched on both sides of the assembly.
- B. This contractor shall verify rating and location of all such construction with the architectural drawings and seal all penetrations.
- C. Manufacturer offering products to comply with the requirements include the following:
 - 1. Dow Corning "Silicone RTV Foam"
 - 2. 3-M Corporation "Fire Barrier Caulk and Putty"
 - 3. Thomas and Betts "Flame Safe Fire Stop System"
 - 4. Specified Technologies "EZ-Path"
- D. Installation of these products are to be in strict accordance with the manufacturer's recommendations and architectural specifications, details or equivalent fire stopping general specification section.
- E. This contractor shall submit shop drawings showing approved sealing assemblies to be utilized on this project.

1.16 HAZARDOUS MATERIALS

- A. If the contractor stores any hazardous solvents or other materials on the site, they shall obtain copies of the safety data sheets for the materials and post them at the site. The contractor shall inform the owner and all employed of any potential exposure to this material.
- B. At no time shall any product containing asbestos be incorporated into the work.
 - 1. If asbestos materials are encountered, report to the owner. The owner will be responsible for asbestos removal.

1.17 RECORD DRAWINGS

- A. This contractor shall provide (at the conclusion of the project) one clean, non-torn, neat and legible "as-built" set of drawings to the owner. These drawings shall show the routing of conduit, wiring and equipment drawn in at scaled locations. All cabling, devices, and endpoints shall be labeled and conform to head end programming and system drawings. All dimensions indicated shall be referenced to a column line. A set of construction blueprints will be furnished for this work.
- B. All system head-end equipment and devices shall be shown on the "as-built" drawings.
- C. Refer to Architectural Specification Sections for additional requirements.
- D. This contractor shall update these drawings during the project at least every week.

1.18 ALTERNATES

- A. Refer to description of alternate bids under General Specification Sections.

1.19 REVIEW OF MATERIALS

- A. This contractor shall submit to the engineer, for review one (1) electronic copy giving a complete list of materials, fixtures, devices and panels he proposes to furnish. The brochure shall contain complete information as to the model of equipment, type, size, capacities, dimensions, and illustration. An electronic copy shall be kept on the job at all times.
- B. Checking of submittal drawings by the engineer does not relieve the contractor of the responsibility for the accuracy of such drawings and for their conformity to drawings and specifications unless he notifies engineer, in writing, of such deviation at time such drawings are furnished.
- C. All submittals shall have the date marked on them when the contractor receives them from the supplier. Submittals shall be submitted through the contractor and shall not come direct from the supplier to the architect or engineer.
- D. This contractor shall mark the date and sign each set signifying that the contractor has checked each of them in their entirety before submitting to the engineer. Submittals that are not dated and signed by the contractor will not be accepted, or checked and will be marked "resubmit" and sent back to the contractor.

1.20 TEST OF SYSTEMS

- A. This contractor, before concealed, shall test all systems installed under this contract as called for in these specifications and as required by local codes. Tests shall be made in the presence of the engineer, local authorities or their duly authorized representative. Any defects discovered in testing shall be corrected and the tests repeated until all defects are eliminated.
- B. This contractor shall coordinate all testing of systems within Division 27 specification section. Follow manufacturer's recommended testing procedures as a minimum unless the following related specification section has further detail of testing procedures. The more stringent testing procedure shall be used.

1.21 SCOPE OF WORK

- A. This contractor shall furnish all the labor and material necessary to install complete communications system for the building.
- B. This contractor shall furnish all the labor and material to install a complete communication system in the new building. The system shall include all items of work as outlined in these specifications and on the drawings.
- C. All work shall be performed by a well-qualified, licensed or certified technician with a thorough knowledge of the various systems involved in this building. It shall be this contractor's responsibility to see that their technicians are familiar with all the various codes, installation procedures and tests applicable to this work.
- D. All equipment shall be new and of the type specified by the engineer unless otherwise noted in these specifications or on the drawings to remain and or be reused.

- E. The intent of the specifications and drawings is for complete installation of the systems outlined in the specifications and drawings so that at the conclusion of construction the system will be turned over to the owner complete and ready for safe and efficient operation.
- F. This contractor is required to furnish and install all such items normally included on systems of this type, which, while not mentioned directly herein or on the drawings are obviously essential to the installation and operation of the system and which are normally furnished on quality installation of this type. The specifications and drawings cannot deal individually with the many minute items that may be eventually required by the nature of the systems.
- G. This contractor, shall before proceeding with any work, review the architectural drawings and specifications. Any conflict between the technology and architectural drawings and specifications shall be reported to the engineer for clarification.
- H. If there is a discrepancy between the drawings and the specifications or within either document, the more stringent requirement shall be estimated unless brought to the engineer's attention and an addendum is issued for clarification.
- I. The Communications Contractor shall establish system elevations prior to fabrication and installation. The Communications Contractor shall coordinate elevations with other trades. All elevations shall be coordinated with all trades in the field prior to installation. When a conflict between trades arises, the design team shall be notified immediately prior to further installation however priority shall be as follows:
 - 1. Lighting Fixtures
 - 2. Gravity flow piping, including steam and condensate.
 - 3. Electrical bus duct.
 - 4. Sheet metal.
 - 5. Cable trays, including access space.
 - 6. Other piping.
 - 7. Conduits and wireway.
- J. Low Voltage Cable Installation
 - 1. This contractor is to install if they are licensed to, or contract with a licensed electrician to install conduit serving low voltage cables located in all mechanical rooms and non-accessible areas and exposed structural areas. Use cable trays in other areas as indicated on the drawings. Where cable trays are not accessible, use J-hooks equal to Cablofil or Caddy Cable CAT. No cable shall be allowed to lie on accessible ceilings tiles. Provide sleeves between walls and accessible clouds. Provide hooks with closure holes and cable ties. Mount hooks 3 feet on center.
- K. Trenching and Backfilling
 - 1. Each contractor is responsible for their own individual trenching and backfilling unless otherwise noted in the drawings or addendum.
 - 2. All underground utilities, telephone conduit, parking lot lighting, tunnels, etc shall be exactly located prior to digging. This contractor shall be held responsible for all damages caused by failure to do so.
 - 3. Any backfill shall be tamped and compacted to prevent future settling. The backfill shall be installed to a smooth and level grade and installed in accordance with local codes.
 - 4. All excess dirt shall be cleared from the area and disposed of as directed by the owner.
 - 5. Refer to architectural specification sections for additional information.

1.22 DAILY HOUSEKEEPING AND CLEANING

- A. At the end of each workday, the contractor shall remove all of their debris, rubbish, tools, and surplus materials from the project work area. The work area shall be broom cleaned and left in a neat and orderly condition. The contractor, for the removal of debris from the project, shall not use the owner's waste disposal facility.
- B. At end of construction, all equipment shall be cleaned and the premises left in first class condition as far as this contractor's work is concerned.

1.23 WALL CONTINUITY (1 HR.)

- A. All items mounted in 1 hr. rated walls requiring an opening larger than a four inch (4") square (16 sq. inches) require the 1 hr. rating not be degraded.
- B. Any system panels in a 1 hr. wall will require the exterior of the recessed panel be covered with 5/8 inch fire rated gypsum board. This is true for any device requiring more than a 16 sq. inch opening.

1.24 DIGITAL MEDIA AGREEMENT

- A. Computer Aided Drafting (CAD) documents may be available to the contractor for some uses. Contact the engineer prior to bidding to determine what information is available to be transmitted to the contractor in digital form.
- B. When documents are determined to be available, and as requested by the contractor, they will be transmitted upon the completion and execution of the MODUS digital media agreement. A service fee for each document transmitted will be assessed to the contractor. Documents will be transmitted upon payment receipt. Current service fee is \$100.00 per CAD sheet.

1.25 SECURE NETWORKABLE DEVICES

- A. Update network devices to the most current software/firmware.
- B. Change default password of all networkable devices.
 - 1. Passwords shall have at least eight characters.
 - 2. Include uppercase and lowercase letters, numerals, and special characters
- C. Supply MAC address and serial number of all networkable devices.
- D. Work with the Owner's IT department to align to existing IT standards.
- E. Provide to the owner a printed and/or electronic spreadsheet log of all network information including, IP addresses, MAC addresses, logins and password information during system training.

1.26 SYSTEM CONFIGURATION AND PROGRAMMING FILES

- A. Supply system configuration and programming files where export is available.
- B. Supply uncompiled programming for systems applicable.
- C. All configuration and programming shall be property of the owner at conclusion of the project.

1.27 COMMISSIONING REQUIREMENTS

- A. Vendors / Subcontractors
 - 1. Provide all requested submittal data, including detailed startup procedures and specific responsibilities of the owner to keep warranties in force.
 - 2. Assist in equipment testing per agreements with subcontractors and/or contractor.
 - 3. Include cost of all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing, operating, and maintaining equipment according to these contract documents in the base bid price to the contractor.
 - 4. Analyze specified products and verify that the A/E has specified the newest, most current equipment reasonable for this project's scope and budget.
 - 5. Provide requested information regarding equipment sequence of operation and testing procedures.
 - 6. Review construction checklists and test procedures for equipment installed by factory representatives.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION 27 0050

SECTION 27 0090

MINOR COMMUNICATION DEMOLITION FOR REMODELING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. The requirements of the Contract Forms, the Conditions of the Contract, Division 1 - General Requirements and Specification Section 26 0050 - Basic Electrical Requirements "General Provisions" apply to this section.

1.02 SCOPE

- A. This contractor shall be responsible for the demolition and removal of all existing communication elements within the project area except as follows:
 - 1. Elements shown on the drawings as "existing to remain and/or to be relocated".
 - 2. Elements serving adjacent areas.
 - 3. Elements required for the support of the newly remodeled areas.
- B. Preserve services to the existing facility. Extend, reroute, and reconnect existing systems as required providing for the continued function of these systems.
- C. Demolition shall be accomplished by the proper tools and equipment for the work to be removed. Personnel shall be experienced and qualified in the type of work to be performed.
- D. This contractor shall remove all abandoned equipment, cabling and boxes associated with the remodeled area unless noted otherwise.
- E. This contractor is responsible for providing communication cabling protection for all existing systems to remain during this project.

1.03 MATERIALS

- A. All elements to be removed are subject to the Owner's Right of Salvage.
- B. All materials removed shall be the property of the removing contractor and shall be removed from the site by them, unless otherwise specified.
- C. The owner may designate and have salvage rights to any material herein demolished by this contractor. It will be the owner's responsibility to designate such salvageable items and remove them prior to the contractor working in that area.

1.04 EXISTING CONDITIONS

- A. Demolition plans are based on casual field observations and existing record documents. Report discrepancies to the owner before disturbing existing installation. Beginning of demolition means installer accepts existing conditions.
- B. If any existing equipment, cabling or devices that are to remain are disturbed by operations under this contract, this contractor is required to re-establish continuity of such systems according to owner approved standards and methods.
- C. This contractor shall arrange for the general contractor to repair and patch all construction with material necessary to match surrounding due to removal of equipment and conduit.
- D. This contractor shall furnish all required labor and material for extension of existing systems.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

- A. Beginning of demolition means installer accepts existing conditions.
- B. Verify existing structured cabling, special systems wiring topology, and reconnect as necessary.
- C. Verify that abandoned cabling being removed is disconnected from the source and is not actively serving other areas of the existing building. Reconnect as required to prevent any system downtime.

- D. Demolition drawings are based on casual field observation and existing record documents. Report discrepancies to the owner before disturbing existing installation.

3.02 PREPARATION

- A. Disconnect structured cabling and special systems components in walls, floors, and ceilings scheduled for removal. Disconnect circuits at the source.
- B. Coordinate any service outage with all of the owner's existing telecommunications service providers.
- C. Existing Communication Network: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchover connections. Obtain permission from the owner, at least 48 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections as required.
- D. Existing Telephone System: Maintain existing system in service. Disable system only to make switchover connections. Obtain permission from the owner, at least 48 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections as required.
- E. Existing Paging Systems:
 - 1. Maintain existing system in service until new systems are accepted.
 - 2. Disable system only to make switch over and connections.
 - 3. Obtain permission from the owner at least 24 hours before partially or completely disabling system.
 - 4. Minimize outage duration.
 - 5. Make temporary connections to maintain service in areas adjacent to work areas.
- F. Maintain all existing communication lines to the building fire alarm system, elevators and intrusion system.

3.03 DEMOLITION AND EXTENSION OF EXISTING COMMUNICATIONS WORK

- A. Demolish and extend existing communications work under provisions of this section.
- B. Remove, relocate, and extend existing installations to accommodate new construction.
- C. Remove abandoned wiring to source of supply.
- D. Disconnect abandoned cable and remove devices. Provide a blank cover for abandoned devices that have not been removed.
- E. Disconnect and remove abandoned patch panels, cross connect fields and special systems distribution equipment.
- F. Disconnect and remove devices and equipment serving abandoned special systems.
- G. Repair adjacent construction and finishes damaged during demolition and extension work.
- H. Extend existing installation using materials and methods compatible with existing communications installations or as specified.

3.04 CLEANING AND REPAIR

- A. Clean and repair existing materials that remain or are to be reused.

3.05 INSTALLATION

- A. Install relocated materials and equipment.

END OF SECTION 27 0090

SECTION 27 0526

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Grounding clamps
- B. Splice
- C. Grounding lugs
- D. Communications grounding rods
- E. Telecommunications bonding backbone
- F. Cable tray bonds
- G. Wall-mount busbars
- H. Rack mount grounding strip

1.02 RELATED SECTIONS

- A. Specification Section 26 0526 - Grounding and Bonding for Electrical System
- B. Specification Section 27 0528 - Pathways for Communication Systems
- C. Specification Section 27 1005 - Telecommunications Cabling Infrastructure

1.03 REFERENCES

- A. ANSI/NFPA-70 2014 National Electrical Code (NEC)
- B. ANSI/IEEE Std. 1100-2005 - Recommended Practice for Powering and Grounding Electronic Equipment
- C. TIA-607-B Telecommunications Grounding (Earthing) and Bonding for Customer Premises
- D. ANSI/TIA-606-B Administration Standard for Telecommunications Infrastructure
- E. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings

1.04 SUMMARY

- A. Provide a communications bonding and grounding system as described within this specification and drawings. System shall be in compliance with the above cited Codes, Standards and Agencies.
- B. Comply with the requirement for Section 26 0526 - Grounding and Bonding for Electrical System.
- C. Bond the following items within the telecommunications grounding system:
 - 1. All communications system active equipment.
 - 2. All PDU and surge protection equipment.
 - 3. Raised floor systems.
 - 4. Underfloor grounding grids for computer or telecommunications rooms.
 - 5. Metallic raceway systems, including metallic cable trays.
 - 6. Communications equipment enclosures (cabinets) or cross-connect frames.
 - 7. Broadband passive devices.
 - 8. Metallic splice cases.
 - 9. Metallic cable screens, armor or shields.
 - 10. All metal cable conduit.
 - 11. Electrical service panels in entrance facilities, telecommunications and equipment rooms.
 - 12. Wall and rack mounted grounding busbars.
 - 13. Exposed building steel that is within 6 feet of equipment racking systems.
 - 14. Building steel extending to earth in outside-plant.
 - 15. All related bonding accessories.

1.05 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
 - 2. Grounding to conform to applicable building codes.
 - 3. Methods of construction that are not specifically described or indicated in the contract documents to be subject to the control and approval of the owner or their official representatives.
 - 4. Equipment and materials specified shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed.
 - 5. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to written approval by the owner per the substitution policy listed within these specifications.
 - 6. Materials and methods shall comply in every way with above cited Standards and Codes.

1.06 SUBMITTALS

- A. Shop drawings shall be submitted showing construction details and locations of components, and description and routing of interconnecting cabling.
- B. Manufacturer's data on all products, including but not limited to:
 - 1. Catalog cut sheets.
 - 2. Roughing in diagrams.
 - 3. Installation instructions.
 - 4. Typical wiring diagrams and risers.
 - 5. Drawings showing device locations.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable building code for requirements applicable to work specified herein.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Deliver items in their original factory shipping cartons.
- B. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

1.09 APPROVED MANUFACTURERS

- A. Panduit
- B. Chatsworth Products, Inc.
- C. Hoffman
- D. Engineer approved equal.

PART 2 PRODUCTS

2.01 GROUNDING CLAMPS

- A. Pipe Clamps:
 - 1. Used to ground copper code conductor to water pipe or copper tubing.
 - 2. Cast from high strength, electrolytic bronze to provide reliable grounding connections.
 - 3. Plated steel screws provide high strength and inhibit corrosion.
 - 4. Accommodates a wide range of pipe, tube, rod and conductor sizes.
 - 5. UL 467 Listed for grounding and bonding with AWG conductor.
- B. Bronze Grounding Clamps for Conduit:
 - 1. Used to ground copper code conductor parallel to, or at a right angle to a rod, tube, or pipe.
 - 2. Made from high strength, electrolytic cast bronze.
 - 3. Accommodates a wide range of pipe, tube, rod and conductor sizes.

4. UL 467 Listed for grounding and bonding with AWG conductor and suitable for direct burial in earth or concrete.
- C. Bronze Grounding Clamps with Lay-in Feature:
 1. Bonds water pipe to continuous copper grounding conductors.
 2. Made from high strength, electrolytic cast bronze.
 3. Bronze hardware provides long term reliable assembly.
 4. UL 467 Listed for grounding and bonding with AWG conductor and suitable for direct burial in earth or concrete.
- D. Zinc Ground Clamp:
 1. Bonds steel and aluminum pipe to aluminum conductors.
 2. Made from die cast zinc.
 3. Zinc plated steel hardware.
 4. UL 467 Listed for grounding and bonding.
- E. Universal Beam Grounding Clamp:
 1. For bonding structural steel such as I-Beams into bonding network.
 2. Universal, fits on a wide range of standard (angled) and wide flange (parallel) structural steel beams.
 3. Provide a mounting pad suitable for a two-whole compression lug.
 4. Installs quickly and easily with standard ¼" key hex wrench tooling.
 5. UL 467 Listed and CSA 22.2 Certified for grounding and bonding suitable for direct burial in earth or concrete.
 6. Comply with vibration tests per MIL-STD-202G.

2.02 SPLICE

- A. Compression-type Aluminum-to-Copper Reducing Splice:
 1. Dual rated for use with aluminum or copper conductors.
 2. Factory pre-filled with joint compound and sealed with easy pull-out end plug to inhibit corrosion.
 3. Color-coded end plug and die index numbers marked on barrel for proper crimp die selection.
 4. Tin-plated to inhibit corrosion.
 5. For use up to 35KV and temperature rated 90 degree C when crimped with manufacturer rated crimping tools and dies.
- B. Code/Flex Conductor H-TAPs:
 1. Used as a splice, or to tap smaller conductors into larger continuous conductors.
 2. Each HTAP terminates a wide range of conductor sizes and combinations of code and flex conductors Class G, H, and I to suit a variety of applications.
 3. Tap grooves are separated from one another, allowing them to function independently so HTAP can be used with single or multiple conductors, providing maximum design and installation flexibility.
 4. Color coded and marked with manufacturer die index numbers for proper crimp die selection.
 5. UL Listed and CSA Certified, with wide size range of conductor sizes and rated for applications up to 600V when crimped with manufacturer rated tools and dies.
 6. Tin plated to inhibit corrosion.
- C. Code Conductor, Thin Wall, Tin -plated C-TAP:
 1. For copper-to-copper splicing or pigtail tap splicing.
 2. Wide wire range-taking capability minimizes inventory requirements.
 3. Color-coded for proper crimp die selection.
 4. Ribbed design provides high strength.
 5. Made from high conductivity wrought copper.
 6. Tin-plated to inhibit corrosion and oxidation.

7. UL Listed and CSA Certified, with wide size range of conductor sizes and rated for applications up to 600V when crimped with manufacturer rated tools and dies.

2.03 GROUNDING LUGS

- A. Copper and Aluminum One-Hole Grounding Lay-in Lug for Bonding Ladder Rack:
 1. Used for quick installation of a continuous grounding conductor.
 2. UL 467 Listed for grounding and bonding, copper lugs. UL Listed for direct burial in earth or concrete.
 3. UL 467 Listed for use up to 600V and temperature rated 90 degree C.
- B. Two-hole, Long-barrel Copper Compression Lugs for Grounding Conductors:
 1. Meets TIA-607-B requirements for network systems grounding applications.
 2. Tested by Telcordia - meets NEBS Level 3 with AWG conductor.
 3. For use up to 35KV and temperature rated 90 degree C when crimped with manufacturer rated crimping tools and dies.
 4. Color-coded barrels marked with manufacturer's die index numbers for proper crimp die selection.
 5. Have long barrel to maximize number of crimps and provides premium wire pull-out strength and electrical performance.
 6. Have "inspection window" over tongue to visually assure full conductor insertion.
 7. Be tin-plated to inhibit corrosion.
 8. Available with NEMA and BISC I hole-sizes and spacing.

2.04 TELECOMMUNICATIONS BONDING BACKBONE (TBB) GROUNDING CONDUCTORS

- A. To be bare or insulated copper, of minimum conductor size #6 AWG and sized at 2 kcmil per linear foot up to a maximum of 750 kcmil. For details on TBB sizing see "Execution" section at end of this document.
- B. Where un-insulated, to be identified with green tape at termination location.
- C. Labeled in accordance with recommendations set forth in ANSI/TIA-606-B Administration for Telecommunications Infrastructure.

2.05 CABLE TRAY BONDS

- A. Split Bolt for Bonding Cable Trays:
 1. Made from high strength copper alloy to resist corrosion and provide premium electrical and mechanical performance.
 2. Wire range-taking capability.
 3. Nut hex provides correct fit with socket, box, or open end wrenches resulting in proper torquing of electrical connection.
 4. Pressure bar provides secure connection on a full range of conductor combinations used with each connector assuring premium wire pull-out strength.
 5. UL Listed and CSA Certified with AWG conductor for use up to 600V and temperature rated 90 degrees C.
 6. Available in tin-plated version for bonding to galvanized wire baskets and tray.
- B. Auxiliary Cable Brackets:
 1. Used for mounting telecommunications bonding conductors outside of cable tray.
 2. Maintain 2" separation between bonding conductors and all other types of cabling per TIA 607-B.
 3. Bonds ladder rack, wire basket sections together without drilling holes or applying other split-bolt clamps.
 4. Supports grounding conductors in the telecommunications room, allows separation of grounding conductors from other cables.
 5. Holds up to four conductors in sizes up to 750 kcmil.
 6. Bonds to all 1" and 2" ladder rack rails.
 7. Pain piercing teeth provide electrical continuity between cable pathway sections while minimizing debris.
 8. Front and back mounting screw options to allow easy visual inspections.

9. Can be mounted above or below the cable pathway system for flexibility.

2.06 WALL MOUNT BUSBARS (TMGB/TGB)

- A. Meet BICSI and TIA-607-B requirements for network systems grounding applications.
- B. Employ BICSI hole spacing to 2-hole lugs.
- C. Be made of high conductivity copper and tin-plated to inhibit corrosion.
- D. Come pre-assembled with brackets and insulators attached for quick installation.
- E. Use labels to identify busbars to meet TIA/EIA-606-A.

2.07 RACK MOUNT GROUNDING STRIP

- A. Provide clean bond to any rack mounted equipment regardless of whether or not equipment has an integrated grounding terminal.
- B. EIA Universal hole pattern.
- C. Provide length required to bond up to 45 RU per rack.

PART 3 EXECUTION

3.01 GENERAL

- A. It shall be the responsibility of this contractor to adapt the following general guidelines and principles for the requirements of the actual environments where the grounding and bonding systems are to be implemented..
- B. System shall provide equipment ground connections (bonds) from the premises entrance facility and outside-plant earthing system to each telecommunication room ground busbar, through the racking systems to bond the network equipment.
- C. Entire grounding link from equipment to earth should be visually verifiable except where hidden by walls, conduit or pathways.
- D. Installing contractor shall label all elements of the communications bonding network according to guidelines defined in TIA-607-B and ANSI/TIA 606-B.
- E. It is the responsibility of the installer to be knowledgeable of all previously cited Standards and Codes and to bring to the attention of the engineer any conflicts discrepancies to achieve a fully functioning, standards-compliant earthing system.

3.02 TELECOMMUNICATIONS BONDING BACKBONE (TBB)

- A. Bonding and grounding conductors may be insulated or un-insulated and shall not decrease in size as the grounding path moves closer to earth.
- B. Connections (bonds) between the telecommunications grounding network and associated electrical panels shall be done by a qualified electrician in accordance with guidelines in TIA 607-B and applicable electrical codes.
- C. Bonding Conductors should be continuous and routed in the shortest possible straight line path, avoiding changes in elevation and sharp bends.
- D. TBB conductors shall be protected from mechanical damage and built so as to minimize splicing. Where splicing is unavoidable they shall be done using irreversible compression splices (C-TAPS) built to that purpose. See the Materials section of this document for appropriate compression splices.
- E. TBB in multi-story buildings with multiple risers shall employ a grounding equalizer (GE) between vertical grounding backbones at the top floor of the building and minimally at every third floor in between to the lowest floor level. The GE shall be no smaller than the largest sized TBB.
- F. Routing grounding conductors through ferrous metal conduit should be avoided, but if it is necessary due to building constraints, any grounding conductor running through ferrous conduit longer than 3 feet shall be bonded at the end using appropriately sized HTAP.
- G. Conductors used to bond TBB to conduit ends shall be of #6 AWG size or larger.

- H. Provide appropriately sized TBB conductor using the pathway distances and the chart found in TIA 607-B.

3.03 ENTRANCE FACILITIES AND TELECOMMUNICATIONS MAIN GROUNDING BUSBAR (TMGB)

- A. TMGB shall be located in the entrance facility, near the electrical panel to which it will be bonded but installed to maintain clearances required by applicable electrical codes.
- B. TMGB shall be sized according to the anticipated number of bonded connections needed.
- C. TMGB shall have tinned surface to restrain oxidation and be cleaned and antioxidant paste applied prior to fastening conductors.
- D. Connectors on TBB which attach to TMGB shall be of two-hole, long-barrel compression lugs as specified in the Materials section of this document.
- E. Building steel within six feet of the communications grounding system should be bonded into the system with appropriate hardware.
- F. All cables containing a metallic shield or armor shall have that shield properly bonded into the communications grounding system using appropriately sized grounding kits from the approved manufacturers.

3.04 TELECOMMUNICATIONS ROOMS AND TELECOMMUNICATIONS GROUNDING BUSBAR (TGB)

- A. Each telecommunications room shall have its own TGB to which equipment and dead steel in that room are bonded.
- B. The TGBs shall be sized according to the anticipated number of bonded connections needed.
- C. TGBs shall have tinned surfaces to restrain oxidation and shall be cleaned and have an antioxidant paste applied to both bonding surfaces prior to fastening conductors.
- D. Connectors on backbone and rack/cabinet bonding conductors which attach to TGB shall be of two-hole, long barrel compression lugs as specified in the Materials section of this document.
- E. Building steel within six feet of the communications grounding system shall be bonded into the system with beam clamps and other hardware appropriate to that purpose.
- F. Racks and cabinets shall have individual Rack Bonding Conductors bonding to the Telecommunications Equipment Bonding Conductor. **Daisy chaining or serial connections of one rack or cabinet to another will not be accepted.**
- G. Rack Bonding Conductors or above rack row grounds (TEBC) shall be installed to maintain a minimum of 2" separation from all other types of cable - power or communications.
- H. To maintain this segregation of cables some telecommunications rooms may lend themselves to the installation of Auxiliary Conduct Brackets for routing bonding conductors outside of, yet parallel to ladder rack or basket tray.
- I. Bonding conductor support systems like auxiliary brackets shall be spaced no further apart than three foot intervals.
- J. All cables containing metallic shielding or armor shall be properly bonded into the communications grounding system using the appropriately sized grounding kit from an approved manufacturer.

3.05 BONDING WITHIN RACKS AND CABINETS

- A. Racks and cabinets shall be bonded into the communications bonding network with conductors of #6 AWG or larger.
- B. Depending on size of the telecommunications room, rack bonding conductors (RBC) may tap into underfloor or overhead grounding conductors, or for smaller TRs (3-5 racks or cabinets), may go directly from the rack to the wall mounted busbar.
- C. Racks, cabinets and similar enclosures shall not be attached serially but must have individual RBC into the grounding system.

- D. Newly installed racks and cabinets shall have vertical grounding busbars installed along one rail to provide clean bonding landing point for all rack mounted equipment. Grounding busbars shall not be isolated from the rack or cabinet.
- E. All painted components of racks/cabinets shall be assembled using serrated grounding washers and thread-forming screws to ensure electrical continuity between the different structural components of the rack/cabinet.
- F. Larger equipment with integral grounding terminals or pads shall be bonded to the vertical busbar with equipment grounding kits attached to those terminals and bonding them to the rack-mounted busbars.
- G. Anywhere two metallic surfaces are to be bonded, contractor shall clean the contact areas of paint or oxidation using abrasive pads, and apply film of anti-oxidation compound between surfaces prior to bonding.
- H. All cable fittings shall be of two-hole compression-type. Mechanical screw-lugs on racking systems will not be accepted and must be removed and replaced at contractor's expense.
- I. All screws used to affix compression lugs to rack-mounted vertical busbars shall be of the thread forming type made specifically for electrical bonding.
- J. Smaller equipment not having integral grounding pads must be bonded to the rack through the equipment mounting flanges using green thread-forming grounding screws with serrations under the head to cut through pain, coatings and oxidation that may be present on the equipment flange. Such equipment shall have minimally one grounding screw per piece of equipment.

3.06 FIELD QUALITY CONTROL

- A. On installations confined to a single telecommunications room, the installing contractor shall visually verify continuity of communications bonding system from equipment, through racking systems, to overhead underfloor backbone to the wall mounted busbar in that telecommunications room.
- B. Contractor shall further verify the use of all appropriate bonding accessories in the racking systems such as grounding washers and thread-forming grounding screws.
- C. Installation of a building-wide telecommunications backbone, installing contractor is further responsible for visually verifying sizing and sound installation of the telecommunications bonding backbone including presence of properly sized and installed grounding equalizer conductors between backbones contained in separate risers.
- D. Inspecting contractor shall verify that any conduit larger than 3 feet through which a grounding conductor passes is properly bonded to the grounding conductor as described in this document.
- E. During inspections contractor shall verify compliance with all stipulations specified in this document and compliance with all regulatory references cited.
- F. All openings or gaps in the bonding system during inspections will be recorded in the inspection report and remedied.
- G. During inspections, contractor shall check all grounding and bonding system conductors and connections for tightness and proper installation, including checking proper dies were used on compression taps and fittings by checking embossed die numbers on those connections.

END OF SECTION 27 0526

SECTION 27 0528
PATHWAYS FOR COMMUNICATION SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Telephone termination backboards
- B. Basket type cable tray
- C. Thru-wall fire stop fittings

1.02 REFERENCES

- A. EIA/TIA-568B - Commercial Building Wiring Standard
- B. EIA/TIA-569B - Commercial Building Standard for Telecommunication Pathways and Spaces
- C. NFPA 70 - National Electrical Code
- D. ASTM A 123 - Specification for Zinc (Hot-Galvanized) Coatings on products fabricated from rolled, pressed, and forged steel shapes, plates, bars, and strip.
- E. ASTM A 525 - General Requirements for steel sheet, zinc-coated galvanized by the Hot-Dip process.
- F. NEMA VE 1 - Metallic Cable Tray Systems

1.03 SUBMITTALS

- A. Product Data:
 - 1. Provide catalog data for nameplates, labels and markers.
 - 2. Provide data for fittings and accessories.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- C. Project Record Documents: Record actual routing of cable tray and locations of supports.

1.04 SYSTEM DESCRIPTION

- A. Pathway: Conform to EIA/TIA 569B, using raceway as indicated.

1.05 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and indicated.

PART 2 PRODUCTS

2.01 TELEPHONE TERMINATION BACKBOARDS

- A. Material: Plywood.
- B. Size: 4' x 8', 3/4 inch thick.
- C. Grade: Fire-retardant, AC grade with "C" grade applied to wall.
- D. Painted on all sides and edges with fire resistant paint, (Sherwin Williams MIL-PRF-24596B).
- E. Apply at location as shown on drawings.

2.02 BASKET TYPE CABLE TRAY

- A. Welded steel wire mesh cable tray. See cable tray and pathway plan on sheets for sizes and finishes.
 - 1. Cablofil
 - 2. Wiremold #WB
 - 3. Flextray
 - 4. Cooper B-Line
 - 5. Engineer approved equal.

- B. Provide manufacturer's standard clamps, hangers, brackets, splice plates, connectors, and grounding straps.
- C. Install tray using a "C" bracket hung from the ceiling or fastened to the wall.
- D. Use tools authorized for installation.
- E. No copper data cabling is to be run in the same space as coaxial television distribution, intercom or sound system.

2.03 THRU-WALL FIRE STOP FITTING

- A. Manufacturers:
 - 1. Specified Technologies EZ-Path
 - 2. Engineer approved equal.
- B. Thru-wall fire stop device for use in through-penetration fire stop system, examined and tested by Underwriters Laboratories Inc. to UL1479 and bears U.S. UL Classification Mark. Device shall be classified for use in one, two, three, and four hour rated gypsum, concrete, and block walls and provided with a maximum "L" rating of 6 CFM.
- C. Box is to be constructed of 16 AWG G90 steel. Provide with adjustable doors.
- D. Provide with grounding lug. Maintain ground continually through all devices.
- E. See plans for sizes, quantities and placements.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Support raceways, backboards and cabinets.
- B. Install termination backboards and cabinets plumb, and attach securely to building wall at each corner.
- C. Install polyethylene pulling string in each empty conduit over ten feet (10') in length or containing a bend.
- D. This contractor shall provide blank cover plates for all indicated telephone and computer outlets.
- E. All conduit sizes shall be verified with the owner prior to installation.
- F. Install metallic cable tray in accordance with NEMA VE 1.
- G. Support cable trays in accordance with Specification Section 26 0529 - Hangers and Supports for Electrical Systems. Provide supports at each connection point, at the end of each run, and at other points as recommended by the manufacturer.
- H. Provide fire stopping under provisions of Specification Section 26 0526 - Grounding and Bonding for Electrical Systems.
- I. Provide continuity between tray components.
- J. Use anti-oxidant compound to prepare aluminum contact surfaces before assembly.
- K. Provide #6 AWG bare copper equipment grounding conductor through entire length of tray; bond to each component.
- L. Connections to tray may be made using mechanical or exothermic connectors.
- M. Cable tray installation shall be coordinate between all project trades. Provide cable tray offsets as required. If issues of coordination arise, project architect and engineer shall determine final use of ceiling space for all trades affected.
- N. Cable tray shall not be installed more than 24" above an acoustical tile ceiling.
- O. Cable tray shall have a minimum of 12" of headroom above the tray and 18" of clearance on the side of the tray for access.

END OF SECTION 27 0528

SECTION 27 1005
TELECOMMUNICATIONS CABLING INFRASTRUCTURE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Backbone copper
- B. Backbone optical fiber
- C. Horizontal copper
- D. Patch panels
- E. Optical fiber distribution panel
- F. Work area outlets
- G. Optical fiber connectors
- H. Wall mounted copper terminations
- I. Grounding and bonding products

1.02 SUMMARY

- A. Work included, but not limited to:
 - 1. Data network backbone cable installation
 - 2. Data network horizontal cable installation
 - 3. Data wiring closet setup
 - 4. Infrastructure cabling management
 - 5. Data patch cables
 - 6. Ground and bonding
 - 7. Testing requirements

1.03 GENERAL REQUIREMENTS

- A. The drawings and specifications indicate the intent and direction of the installation. Items and their location are shown diagrammatic and are to be field verified by the cabling contractor prior to completing work associated with the item.
- B. All cabling work shall be performed in strict accordance with all applicable laws, ordinances, codes of local, state and federal government, or other authorities having lawful jurisdiction. The cabling contractor is required to verify all requirements.
- C. The cabling contractor shall furnish all required labor, material, and associated tools to facilitate the installation of all the infrastructure cables and associated items specified herein and with respect to the infrastructure design drawings without damage to the cables, associated items, and/or facilities.
- D. Qualified personnel, utilizing state-of-the-art equipment and techniques shall complete all installation work.
- E. All cables routed outside of the cable runway installed shall be properly supported.
- F. All wall and/or floor penetrations shall be via metal conduit sleeves properly sized, supported and fire stopped.
- G. All materials shall be installed in accordance with the manufacturer's specified recommendations and practices.

1.04 QUALITY ASSURANCE

- A. Standards: All telecommunications wiring, cabling devices, and other associated items and work shall conform to the most recent requirements of the following codes, standards, and organizations where applicable:
 - 1. American National Standards Institute (ANSI)
 - 2. Electronic Industries Association (EIA)
 - 3. Federal Communications Commission (FCC)

4. Institute of Electrical and Electronic Engineers (IEEE)
 5. International Organization for Standardization (ISO)
 6. National Electric Code (NEC)
 7. National Fire Protection Association (NFPA)
 8. BOCA National Building Code
 9. Underwriter's Laboratories (UL)
 10. Telecommunications Industry Association (TIA)
 11. Building Industry Consulting Services International
 12. Society of Cable Telecommunications Engineers (SCTE)
- B. The copper data infrastructure cable system shall have a manufacturer's material and labor performance certification for the installed cable and components. The certification shall be that UTP Category 6 cabling infrastructure will perform to TIA's specifications for that Category. A manufacturer's written certification document shall be submitted at the completion of the project.
- C. A matched solution shall be provided end-to-end for all cabling infrastructure. No third party components shall be provided unless otherwise noted elsewhere in the project specification or drawings.
- D. The installer must be able to provide a warranty to the owner. Duration of the warranty shall be a minimum of ten years from the date of project completion and acceptance. It shall cover all of the product as well as their performance for the warranty period.
- E. The cabling contractor shall be in business for a minimum of five (5) years.
- F. The contractor must be registered with BICSI and have at least one Registered Communications Distribution Designer (RCDD) on full-time staff or be approved by the project engineer during the bidding process. Prospective contractors shall seek written approval from project engineer no later than seven days prior to bidding. Include in request to project engineer a list of full-time staff with certifications and references to three projects of similar size and scope in previous two years.
- G. The contractor must possess current liability insurance certificates.
- H. Provide a complete and detailed test plan for the telecommunications cabling system including a complete list of test equipment for the components and accessories for each cable type specified, 30 days prior to the proposed test date. Include procedures for certification, validation, and testing.

1.05 SUBMITTALS

- A. The cabling contractor shall not begin any installation of materials that require a material fact sheet and/or sample to be submitted and approved by the project engineer. If material is installed prior to approval, the bidder is liable for the cost of removal and replacement if the material is not approved.
- B. The cabling is to provide material cut-sheet for all products (including cabling) listed in this specification, and any other material not listed but required for proper installation.
- C. Provide both the manufacturer's certification for all installers and technicians that will have a role in this project as well as all BICSI certifications as outlined in the sections above.
- D. Provide most recent calibration certificate for testing equipment indicating the period of calibration.

1.06 CLOSE-OUT AND FINAL ACCEPTANCE

- A. Operations and Maintenance Manuals
1. Commercial off the shelf manuals shall be furnished for operation, installation, configuration, and maintenance of products provided as a part of this project. Submit operations and maintenance data not later than 2 months prior to the date of occupancy.
- B. Drawings and As-Builts
1. Provide drawings including documentation on cables and termination hardware in accordance with TIA/EIA-606. Drawings shall include schedules to show information for cut-overs and cable plant management, patch panel layouts and cover plate assignments,

cross-connect information and connecting terminal layout as a minimum. Drawings shall be provided in hard copy format and on electronic media for project engineer's review and final delivery to owner. Provide the following drawing documentation as a minimum:

- a. Cables - A record of installed cable shall be provided in accordance with TIA/EIA-606. The cable records shall include only the required data fields in accordance with TIA/EIA-606. Include manufacture date of cable with submittal.
- b. Termination Hardware - A record of installed patch panels, cross-connect points, distribution frames, terminating block arrangements and type, and outlets shall be provided in accordance with TIA/EIA-606. Documentation shall include the required data fields only as a minimum in accordance with TIA/EIA-606.
- c. Working Red Line Drawings - A hand completed set of drawings indicating the general cable routing of the backbone cables and the primary routes of the horizontal cables shall be provided. Also indicate all wall and floor sleeves utilized. The drawings for this information shall be a non-working, clean set of drawings.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. The cabling contractor shall coordinate all delivery, storage and handling concerns with the general contractor.
- B. Provide protection from weather, moisture, extreme heat and cold, dirt, dust, and other contaminants for telecommunications cabling and equipment placed in storage.

1.08 APPROVED CABLING VENDORS

- A. All cabling and connectivity products provided by the structured cabling contractor shall be part of the following complete end-to-end systems:
 1. Panduit
 2. Belden
 3. Commscope
 4. BerkTek
 5. Engineer approved equal.
- B. All components in the cabling channel shall be of the same manufacturer with performance that meets or exceeds the characteristics of the horizontal cabling.

1.09 JACKET TYPE

- A. As per NEC, this building is to have plenum-rated cable and products used exclusively. No "non-plenum" parts shall be installed.

1.10 COLORS

- A. The owner shall determine all colors of cables, jack inserts, and other visible components during the submittal process from the standard colors available by each individual manufacturer. No custom colors will be used.

PART 2 PRODUCTS

2.01 BACKBONE COPPER

- A. Category 3 rated multipair backbone cable
 1. Provide copper backbone cabling that shall be solid conductor, 24 AWG, 100 ohm, 25 -pair, UTP, in accordance with TIA-568-C.1, TIA-568-C.2, formed into 25 pair binder groups covered with a thermoplastic jacket. Cable shall be imprinted with manufacturer's name or identifier, flammability rating, gauge of conductor, transmission performance rating at regular length marking intervals. Provide plenum (CMP) rated cabling.
 2. Quantity: Refer to the drawings for further information.

2.02 BACKBONE OPTICAL FIBER

- A. Single Mode Fiber Optic Cabling
 1. Provide OS2 plenum two (2) 72-strand tight buffered fiber optic cabling from the outside fiber entrance closet to the main distribution frame.
 - a. Corning

- b. Commscope
- 2. Quantity: Refer to the drawings for further information.

2.03 HORIZONTAL COPPER

- A. Data and Voice:
 - 1. Provide unshielded Twisted Pair (UTP), Category 6 4/pair, 23 AWG to locations identified on the plans.
 - a. Panduit - TX6000
 - b. Commscope Uniprise - UltraMedia 7504
 - c. Belden - Data Twist 3600
 - d. BerkTek - LANmark 1000
 - e. Superior Essex - DataGain 6+
 - f. Engineer approved equal
 - g. Cabling shall be also provided to each video surveillance camera shown on the plans unless otherwise noted.
 - h. Color to be determined by the owner.
- B. Patch Cables - Data Racks (Copper):
 - 1. Provide pre-connectorized copper patch cables that match performance and configuration of horizontal data and voice cabling. Length as required for installation per BICSI standards.
 - 2. Quantity: Structured cabling subcontractor shall provide sufficient patch cords for 75% of horizontal cable runs. For bidding purposes, use an average cord length of 10 feet for patch cords.
 - 3. Color and exact length shall be determined by the owner.
- C. Patch Cables - Workstations:
 - 1. Match performance and configuration of horizontal data and voice cabling. Length as required for installation per BICSI standards
 - 2. Quantity: Structured cabling subcontractor shall provide a workstation patch cord quantity equal to 50% of all wall-terminated data outlets. For bidding purposes, use an average cord length of 10 feet for patch cords. Patch cords shall be turned over to owner.
 - 3. Color and exact length shall be determined by the owner.

2.04 PATCH PANELS

- A. Data and Voice:
 - 1. Modular 24 or 48 position, 19 inch rack, 1U or 2U, UTP patch panel. Panel to meet performance standards of horizontal cabling manufacturer. Patch panel bracket shall accept RJ45 modular jacks that are utilized at the work area outlet.
 - a. Product shall be a matched solution from cabling manufacturer
 - b. Quantity as needed for all connections in contractor plus 25% at each rack for future growth.

2.05 OPTICAL FIBER DISTRIBUTION PANEL

- A. Panel shall be a rack mounted optical fiber distribution panel constructed utilizing a minimum of 18 gauge steel. Panel shall be divided into two sections, distribution and user. Distribution section shall have strain relief, routing guides, splice tray and shall be lockable. The user section shall have a cover for patch cord protection. Each panel shall provide pigtails and adapters. Provide adapters as LC type.
 - 1. Product shall be a matched solution from cabling manufacturer.
- B. Provide pre-connectorized fiber patch cables with matching connectors as specified. Patch cords shall meet same performance requirements as backbone fiber optic cabling. Length as required for installation per BICSI standards.
 - 1. Product shall be a matched solution from cabling manufacturer.

2.06 WORK AREA OUTLETS

- A. Work Area Data/Voice Jacks:

1. Jacks shall be modular RJ-45 style and meet performance requirements of horizontal cabling.
 - a. Product shall be a matched solution from cabling manufacturer.
 - b. JACK COLOR FOR STATE NETWORK TERMINATION SHALL BE BLUE.
 - c. JACK COLOR FOR COUNTY NETWORK TERMINATION SHALL BE ORANGE.
- B. Work Area Outlet Cover Plate:
 1. Telecommunications cover plates shall comply with TIA-568-C.1 and shall be flush design constructed of high impact thermoplastic material and match the style and color of receptacles and switch cover plates. Provide any blank inserts as required for all unused openings.
 - a. Product shall be a matched solution from cabling manufacturer.
- C. Voice Wall-Mounted Outlet:
 1. Provide stainless steel phone faceplate with steel screw terminals and information outlet capable of RJ45 connection to normal phone.
 - a. Product shall be a matched solution from cabling manufacturer.

2.07 OPTICAL FIBER CONNECTORS

- A. Optical fiber connectors shall all be of the LC style unless noted elsewhere.

2.08 WALL FIELD COPPER TERMINATIONS

- A. Provide 25 pair 110 style insulation displacement blocks for cable terminations. Termination block shall be performance rated to the category cabling being installed.
 1. Product shall be a matched solution from cabling manufacturer.

2.09 GROUNDING AND BONDING PRODUCTS

- A. Provide in accordance with UL 467, TIA J-STD-607, and NFPA 70. Components shall be identified as required by TIA/EIA-606. Provide ground rods, bonding conductors, and grounding busbars as specified in specification section 26 0526 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

PART 3 EXECUTION

3.01 GENERAL

- A. The drawings and specifications are considered to reflect the intent and direction for a complete data cable system.
- B. Quantities shown are for general information and may be incorrect. The bidder is to verify all quantities and is to report any count differences to the engineer prior to submission of their installation response. The cabling contractor will be held responsible for all required quantities to complete the project to the intent and direction of the drawings and specifications.
- C. Material description and manufacturer's part numbers are shown. The cabling contractor is expected and has the responsibility to verify that the part number matches the description. Any discrepancy is to be noted to the engineer prior to response submittal. The cabling contractor is responsible for the correct materials being furnished and installed.
- D. Install telecommunications cabling and pathway systems, including the horizontal and backbone cable, pathway systems, telecommunications outlet/connector assemblies, and associated hardware in accordance with TIA-568-C.1, TIA-568-C.2, TIA-569, NFPA 70 and UL standards as applicable. Provide cabling in a star topology network. Pathways and outlet boxes shall be installed as specified in specification section 26. Install telecommunications cabling with copper media in accordance with the following criteria to avoid potential electromagnetic interference between power and telecommunications equipment. The interference ceiling shall not exceed 3.0 volts per meter measured over the usable bandwidth of the telecommunications cabling.
- E. Install UTP telecommunications cabling system as detailed in TIA-568-C.1. Screw terminals shall not be used except where specifically indicated on plans. Use an approved insulation displacement connection tool kit for copper cable terminations. Do not exceed manufacturers' cable pull tensions for copper and optical fiber cables. Provide a device to monitor cable pull

tensions. Do not exceed 25 pounds pull tension for four pair copper cables. Do not chafe or damage outer jacket materials. Use only lubricants approved by cable manufacturer. Do not over cinch cables, or crush cables with staples. For UTP cable, bend radii shall not be less than four times the cable diameter. Cables shall all be terminated. There shall be no cable with unterminated elements. Cabling shall be continuous with no splices. Label cabling in accordance with paragraph titled LABELING.

3.02 BACKBONE CABLING

- A. Copper backbone cable. Install intrabuilding backbone copper cable, in indicated pathways, between the campus distributor, located in the telecommunications entrance facility or room, the building distributors and the floor distributors located in telecommunications rooms and telecommunications equipment rooms as indicated on drawings.
- B. Optical fiber backbone cable. Install intrabuilding backbone optical fiber in indicated pathways. Do not exceed manufacturer's recommended bending radii and pull tension. Prepare cable for pulling by cutting outer jacket 10 inches, leaving strength members exposed for approximately 10 inches. Twist strength members together and attach to pulling eye. Vertical cable support intervals shall be in accordance with manufacturer's recommendations.

3.03 HORIZONTAL CABLING

- A. Install horizontal cabling as indicated on drawings. Do not untwist Category 6/6A UTP cables more than one half inch from the point of termination to maintain cable geometry. Provide slack cable in the form of a figure eight (not a service loop) on each end of the cable, 10 feet in the telecommunications room, and 12 inches in the work area outlet.

3.04 PATHWAYS

- A. Provide in accordance with TIA-569 and NFPA 70. Provide building communications cabling pathway as specified in Section 26 0533 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS and SECTION 27 0528 PATHWAYS FOR COMMUNICATION SYSTEMS.

3.05 WORK AREA OUTLETS

- A. Terminate UTP cable in accordance with TIA-568-C, TIA-568-C.2 and wiring configuration as specified. All fiber optic cabling shall be terminated in accordance with TIA-568-C.3. Follow manufacturer's installation guidelines for all specific requirements related to work area outlet termination.

3.06 COVER PLATES

- A. As a minimum, each outlet shall be labeled as to its function and a unique number to identify cable link in accordance with the section titled LABELING.

3.07 PULL CORDS

- A. Pull cords shall be installed in conduit serving telecommunications outlets that do not have cable installed.

3.08 PATCH PANELS

- A. Patch panels shall be mounted in equipment racks with sufficient ports to accommodate the installed cable plant plus 25 percent spares. Copper entering a patch panel shall be secured to the panel as recommended by the manufacturer to prevent movement of the cable.

3.09 EQUIPMENT RACKS, BRACKETS AND CABINETS

- A. All equipment racks, brackets and cabinets hosting telecommunications equipment shall all be installed in accordance with the manufacturer's recommendations. Permanently anchor all racks to the floor.

3.10 GROUNDING AND BONDING

- A. Provide in accordance with TIA J-STD-607, NFPA 70 and as specified in Section 26 0526 GROUNDING & BONDING FOR ELECTRICAL SYSTEMS.

3.11 LABELING

- A. Provide labeling in accordance with TIA/EIA-606. Handwritten labeling is unacceptable. Stenciled lettering for voice and data circuits shall be provided using either thermal ink transfer or laser printing.
- B. Cables shall be labeled using color labels on both ends with identifiers in accordance with TIA/EIA-606.
- C. Workstation outlets and patch panel connections shall be labeled using color coded labels with identifiers in accordance with TIA/EIA-606.

3.12 WIRELESS SYSTEM - POST INSTALL

- A. The classroom environment shall be reliant on the stability, performance and facilities-wide coverage of this new wireless network. It shall be this contractor's responsibility to perform a post-installation signal strength test to verify complete coverage is being provided in each of the new project areas.
- B. The wireless access system shall be tested at project substantial completion. Provide a report with readings and layout showing detected coverage by Ekahau or AirMagnet analyzers. Deliver in electronic format for engineer review.
- C. The wireless system coverage report may result in some adjustments to the wireless access point layout. This contractor shall assist in a one-time device relocation to achieve full coverage, so far as the installed cable will allow.
- D. No hand-written test results will be accepted.

3.13 CABLE TESTING

- A. General: Cables are to be tested after installation is complete with Fluke DTX tester or equivalent and delivered in electronic format for engineer review. If for any reason, the drop location, raceway and/or drop location box is removed for additional work of any nature, the drop location is to be re-tested if previously tested. All cables associated with the drop location are to be re-tested. The cost of re-testing is the responsibility of the cabling contractor.
 - 1. The field-test instrument shall be within the calibration period recommended by the manufacturer, typically 12 months.
- B. Category 6/6A Data - Unshielded Twisted Pair (UTP) Cable:
 - 1. Each UTP CAT 6 data cable installed shall be tested and a test result printout sheet shall be furnished at the completion of the project.
 - 2. The test shall be performed after the final cable and device termination has been completed and the faceplate installed. The test shall be of the "Basic Link" from completed end to completed end.
 - 3. The test shall be conducted utilizing a scanner that will generate a sweep frequency 1-250 megahertz signal on all pairs of the cable and test each pair of the cable for:
 - a. Pair mapping
 - b. Cable length
 - c. Insertion loss
 - d. Near-End-Cross Talk (NEXT)
 - e. Attenuation to Near-End-Cross Talk Ratio (ACR)
 - f. Return loss (RL)
 - g. Power Sum Near-End-Cross Talk (PSNEXT)
 - h. Power Sum Equal Level Far-End-Cross Talk (PSELFEXT)
 - i. Far End Cross Talk (FEXT)
 - j. Propagation Delay & Delay Skew
 - k. Impedance
 - l. Capacitance
 - m. Resistance
 - 4. Each data cable shall be tested to EIA/TIA-568, Category 6, compliance for acceptance.

5. Each test result shall indicate the cable number, test date and tester name. All test results are to be submitted to the project engineer in electronic format for review during closeout and final acceptance.
 6. No hand written test results will be accepted by the project engineer.
- C. Fiber Optic Cable
1. Each strand in fiber optic cable shall be tested for correctness of termination, overall transmission loss, and defects using an approved Optical Time Domain Reflectometer (OTDR) and a power meter. The engineer shall have the option to be present during testing. Notify the engineer one week prior to testing.
 2. Pre-terminated fiber solutions shall be tested by factory providing termination. Field testing is not required.
 3. Testing Equipment manufacturers:
 - a. Agilent Technologies
 - b. Fluke
 - c. Microtest
 - d. Noyes
 - e. Ideal
 4. Multimode fiber testing shall be I.A.W. TIA/EIA-526-14 Method "B". System loss measurements (both calculated and measured) shall be provided at 850 and 1300nm in both directions for multimode cables (1310 and 1550nm for singlemode) for each strand. Per IEEE 802.3z, maximum fiber strand attenuation shall not exceed 2.38dB @ 850nm with a modal bandwidth of 160Mhz-km and 2.35dB @ 1310nm with a modal bandwidth of 500Mhz-km. Test as follows:
 - a. Measure and record normalized fiber loss at operating wavelength in dB/kn.
 - b. Detect and record point faults or discontinuities.
 - c. Measure and record overall length of cable.
 5. Certification report shall be provided listing both the calculated and measure loss for each fiber optic circuit and submitted with the test results as called for above. Documentation of testing shall include:
 - a. Wavelength, fiber type, fiber manufacturer and cable model number, cable manufacturers' attenuation specifications, cable manufacturers' bandwidth specifications, measurement direction, test equipment and serial numbers (with date of last calibration), date of each test, reference setup, name of technician(s) performing testing.
 - b. OTDR trace(s) shall be submitted with require for substantial completion.
 6. Each test result shall indicate the cable number, test date and tester name. All test results are to be submitted to the project engineer in a neat, clean and orderly nature. The test sheets are to be submitted electronically and divided by panel in numeric order.
 7. No handwritten test results will be accepted by the project engineer.

3.14 EXTRA MATERIALS AND LABOR

- A. This contractor shall include in their bid an allowance to install six (6) additional data outlets with an average length of 200 feet as directed by the project engineer at any time during the construction process. Any materials that are not used during construction shall be turned over to the owner at the final acceptance of the building.

END OF SECTION 27 1005

**SECTION 27 5124
INTERCOM SYSTEM**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Intercom system

1.02 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of devices and wiring.

1.03 OPERATION AND MAINTENANCE DATA

- A. Operation Data: Include instructions for routine operation of master and remote stations.
- B. Maintenance Data: Include instructions for minor troubleshooting, preventive maintenance, and cleaning.

1.04 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- B. Supplier: Company authorized by manufacturer and specializing in supplying products specified in this section with minimum three years experience.
- C. Installer: Company specializing in installing the products specified in this section with minimum three years experience.

1.05 MAINTENANCE SERVICE

- A. Furnish service and maintenance of intercom system for one year from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 INTERCOM SYSTEM

- A. Relocate existing speakers and amplifier to new telecom room.
- B. Provide new cable from existing speaker to new telecom room.
- C. Coordinate connection with state provided phone system.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Verify that required utilities are available, in proper location, and ready for use.
- C. Beginning of installation means installer accepts conditions.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.03 FIELD QUALITY CONTROL

- A. Perform operational test on completed installation to verify proper operation.
- B. Replace equipment, components, and wiring to eliminate audible noise, clicks, and pops or hum when system is in standby or operation.

3.04 MANUFACTURER'S FIELD SERVICES

- A. Make final connections to units.
- B. Perform field inspection and testing.
- C. Demonstrate system operation.

3.05 ADJUSTING

- A. Adjust controls and configuration switches for operation as indicated.

3.06 DEMONSTRATION

- A. Provide systems demonstration and instructions.
- B. Conduct walking tour of project and briefly describe function, operation, and maintenance of each component.
- C. Use submitted operation and maintenance manual as reference during demonstration and training.

END OF SECTION 27 5124

SECTION 28 0050

BASIC ELECTRONIC SAFETY AND SECURITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Basic Electronic Safety and Security Requirements specifically applicable to Electrical Division Specification Sections.
- B. Division 28 Specification requirements also include, by reference, all Division 00 and 01 specification sections. This contractor is responsible to review these specification sections. Requirements of these specification sections are included as a part of this contract.
- C. Division 28 Specification requirements also include, by reference, Specification Section 08 7100 - Door Hardware. Review and inclusion of the electrical requirements of this specification section are included as a part of this contract.

1.02 WORK BY OWNER

- A. The Following Products Will Be Furnished By The Owner:
 - 1. Existing card access is Millennium. Existing door control units shall be reused and relocated where applicable.
 - 2. Existing ExacqVision video surveillance system server shall be relocated as part of the project.
 - 3. Existing security cameras noted shall be reused and relocated as noted.
- B. Owner's Responsibility:
 - 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.
- C. Contractor's Responsibility:
 - 1. Review owner reviewed shop drawings, product data and samples.
 - 2. Review and unload owner purchased materials at site, inspect for completeness and/or damage jointly with the owner.
 - 3. Handle, store, install and finish products. Install electrical wiring and devices.
 - 4. Repair and/or replace items damaged after receipt.

1.03 OWNER OCCUPANCY

- A. The owner will occupy the premises during the construction period.
- B. Limit use of site and premises to allow owner occupancy.
- C. Cooperate with the owner to minimize conflict and to facilitate owner's operations.
- D. Schedule the work to accommodate this requirement.

1.04 REGULATORY REQUIREMENTS

- A. This contractor shall give proper authorities all requisite notices relating to work in their charge, obtain official permits, licenses for temporary construction and pay proper fees for it.
- B. This contractor is to be solely answerable for and shall promptly make good all damage, injury or delay to other contractors, to neighboring premises or to persons or property of the public by themselves, by their employees or through any operation under their charge, whether in the contract or extra work.
- C. No attempt has been made to reproduce in these specifications any of the rules or regulations contained in city, state or federal ordinances and codes pertaining to the work covered by these specifications that the contractor be thoroughly familiar with all such ordinances and codes.

- D. The fact that said various rules, regulations and ordinances are not repeated in this specification does not relieve the contractor of the responsibility of making the entire installation in accordance with the requirement of those authorities having jurisdiction.
- E. All work shall comply with the applicable recommendations of:
 - 1. National Board of Fire Underwriters
 - 2. ANSI-NFPA 70 National Electrical Code
 - 3. National Fire Protection Association (NFPA)
 - 4. Occupations Safety and Health Act (OSHA)
 - 5. IBC Building Code (current) and any current applicable city building and or electrical codes.
 - 6. Fire Protection: Conform to UFC and NFPA
 - 7. The Joint Commission
 - 8. Iowa Administrative Code, Chapter 61
- F. Obtain permits and request inspections from authority having jurisdiction.
- G. Conform to latest approved versions of codes.

1.05 PROJECT/SITE CONDITIONS

- A. Install work in locations shown on drawings unless prevented by project conditions.
- B. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to work specified in other sections. Obtain permission of owner and architect/engineer before proceeding.
- C. This contractor shall, before submitting their bid, visit the site of the project to familiarize themselves with locations and conditions affecting their work.
- D. It is the intent of this specification that the contractor furnishes all labor and material required to complete the installation as outlined in the drawings and specifications. No additions to the contract price shall be allowed due to the failure of this contractor to properly evaluate the effect of existing conditions on the work to be done under this contract.
- E. Whenever renovation or remodeling or relocation of existing equipment is included in the contract, it is imperative that all locations of existing wiring conduits, electrical panels, equipment, services and grades be noted on the job site before bid is submitted and that all elevations and grades be verified before roughing in new work.
- F. This contractor shall provide holes as necessary for the installation of their work and in accordance with materials other than the structure.

1.06 SEQUENCING AND SCHEDULING

- A. This contractor shall arrange their work in order that it progresses along with the general construction of the building.
- B. This contractor shall be kept informed as to the work of other trades engaged in this project and shall execute their work in such a manner so as not to delay or interfere with progress of other contractors.
- C. Where space for electrical lines and conduit is limited, it is imperative that all such trades coordinate their work so as to Ensure concealment in space provided. Where conflict exists, the design team shall decide priority of space. If work is not properly coordinated, the design team may require removal and relocation of work without additional compensation.

1.07 GUARANTEE

- A. This contractor shall guarantee all of the apparatus, materials, equipment furnished and labor installed under this contract for a period of one year after date of final acceptance, unless a longer period is specified.
- B. Neither final certificate of payment nor any provisions in the contract documents nor partial or complete occupancy of premises by owner shall constitute an acceptance for work not done in accordance with contract documents or relieve the contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship.

- C. Should any defects arise as the result of defective workmanship or material within the guarantee period set forth, this contractor shall make the necessary correction at their own expense.

1.08 ENGINEER APPROVED EQUAL PRODUCTS

- A. When the engineer, at the request of the interested parties, including the contractor, supplier and manufacturer approved "engineer approved equal" products for this project, such products are approved on the assumption that they will equal or exceed the performance of the products specified.
- B. If such products do not do so after being installed on this project, this contractor shall replace or modify the particular product as necessary to equal the performance of the products specified at no expense to the owner, architect or engineer.
- C. Request for "engineer approved equal" products shall be received by the architect/engineer prior to the last addendum being issued. Requests for substitutions received after this date will not be considered. Substitution requests shall clearly state which products are being considered for substitution. Substitution requests shall include all pertinent product information needed to evaluate the substitution as an "equal".
- D. Similar products shall be all of the same manufacturer and style. There is no exception to this unless prior approval has been granted from engineer.

1.09 OWNER'S RIGHT OF SALVAGE

- A. Before beginning construction the contractor shall check and verify with the owner each item of existing equipment that must be removed.
- B. The owner will designate which items of material or equipment not reused that they may wish to keep. This contractor shall then remove these items with care and store in a location designated by the owner for the owner's disposal.
- C. All other items of equipment to be removed and not specified for reuse in new construction or reserved by the owner for their use shall become the property of the contractor and shall be removed from the site.

1.10 PROTECTION AND MAINTENANCE

- A. The work covered by these drawings and specifications involves all work in the existing building.
- B. Where necessary to connect to any existing utility service, this contractor shall contact the owner and shall coordinate any building service connection with the owner so that normal operation to the building is disrupted as little as possible.
- C. Any work to be done in existing structures shall be coordinated with the owner and arrangements made so that traffic flow may be maintained and areas finished where possible before other areas are begun.
- D. This contractor shall protect existing equipment in finished areas from dirt, dust and damage as a result of their work.
- E. Coordinate protection requirements with department heads before beginning construction.
- F. Protect any building openings from unauthorized entry. Coordinate with owner where building entry must be controlled.

1.11 DEMOLITION

- A. This contractor shall be responsible for the demolition and removal of all existing electrical elements within the project area except as follows:
 - 1. Elements shown on the drawings as "existing to remain and/or to be reused".
 - 2. Elements serving adjacent areas.
 - 3. Elements required for the support of the newly remodeled areas.
 - 4. All elements to be removed are subject to the Owner's Right of Salvage.
- B. Preserve services to the existing facility. Extend/reroute/reconnect the existing systems as required providing for the continued function of these systems.

1.12 CUTTING AND PATCHING

- A. This contractor shall do all cutting and patching necessary for the installation of their work in all existing and new buildings unless otherwise noted.
- B. In areas where the integrity of fire separation assembly/wall is compromised by the work, this contractor shall be responsible to patch and/or seal openings as necessary to maintain and/or return fire separation to rating as required by applicable codes.
- C. This contractor shall do all cutting and patching required for their work beyond the remodeled areas unless otherwise noted. All finish work shall include patching to match existing adjacent surfaces. Painting shall be by others.

1.13 CLEANING AND RUBBISH

- A. This contractor, upon completion of their work, shall remove all rubbish and debris resulting from their operation and shall remove it from site at their own expense.
- B. As far as their work is concerned, all equipment shall be cleaned and the premises left in first class condition.
- C. This contractor shall maintain the work area each day to prevent hazardous accumulation of debris from their work.

1.14 SEALING AND PENETRATION

- A. Clearance around the piping passing through fire or smoke rated construction shall be sealed to maintain the rated integrity of the construction (1 hr. 2 hrs. etc.). One and two-hour rated assemblies are to be patched on both sides of the assembly.
- B. This contractor shall verify rating and location of all such construction with the architectural drawings and seal all penetrations.
- C. Manufacturer offering products to comply with the requirements include the following:
 - 1. Dow Corning "Silicone RTV Foam"
 - 2. 3-M Corporation "Fire Barrier Caulk and Putty"
 - 3. Thomas & Betts "Flame Safe Fire Stop System"
- D. Installation of these products are to be in strict accordance with the manufacturer's recommendations and architectural specifications, details or equivalent fire stopping general specification section.
- E. This contractor shall submit shop drawings showing approved sealing assemblies to be utilized on this project.

1.15 HAZARDOUS MATERIALS

- A. If this contractor stores any hazardous solvents or other materials on the site, they shall obtain copies of the safety data sheets for the materials and post them at the site. The contractor shall inform the owner and all employed of any potential exposure to this material.
- B. At no time shall any product containing asbestos be incorporated into the work.
 - 1. If asbestos materials are encountered, report to the owner. The owner will be responsible for asbestos removal.

1.16 RECORD DRAWINGS

- A. This contractor shall provide (at the conclusion of the project) one clean, non-torn, neat and legible "as-built" set of drawings to the owner. These drawings shall show the routing of conduit, wiring and equipment drawn in at scaled locations. All cabling, devices, and endpoints shall be labeled and conform to head end programming and system drawings. All dimensions indicated shall be referenced to a column line. A set of construction blueprints will be furnished for this work.
- B. All electrical panels and electrical installed equipment shall be shown on the "as-built" drawings.
- C. Refer to Architectural Specification Sections for additional requirements.
- D. This contractor shall update these drawings during the project at least every week.

1.17 ALTERNATES

- A. Refer to description of alternate bids under General Specification Sections.

1.18 REVIEW OF MATERIALS

- A. This contractor shall submit to the engineer for review one (1) electronic copy giving a complete list of materials, fixtures, devices and panels they propose to furnish. The brochure shall contain complete information as to the model of equipment, type, size, capacities, dimensions, and illustration. An electronic copy shall be kept on the job at all times.
- B. Checking of submittal drawings by the engineer does not relieve the contractor of the responsibility for the accuracy of such drawings and for their conformity to drawings and specifications unless the contractor notifies engineer, in writing, of such deviation at time such drawings are furnished.
- C. All submittals shall have the date marked on them when the contractor receives them from the supplier. Submittals shall be submitted through the contractor and shall not come direct from the supplier to the architect or engineer.
- D. This contractor shall mark the date and sign each set signifying that the contractor has checked that each of them in their entirety before submitting to the engineer. Submittals that are not dated and signed by the contractor will not be accepted, or checked and will be marked "resubmit" and sent back to the contractor.

1.19 TEST OF SYSTEMS

- A. This contractor, before concealed, shall test all systems installed under this contract as called for in these specifications and as required by local codes. Tests shall be made in the presence of the engineer, local authorities or their duly authorized representative. Any defects discovered in testing shall be corrected and the tests repeated until all defects are eliminated.
- B. This contractor shall be held responsible for all damage resulting from defects in the system.
- C. Each individual feeder circuit shall be tested at the panel and in testing for insulation resistance to ground; the power equipment shall be connected for proper operation. In no case shall the insulation resistance to ground be less than that required by the National Electrical Code (NEC).

1.20 SCOPE OF WORK

- A. This contractor shall furnish all the labor and material necessary to install complete safety and security systems for the building.
- B. This contractor shall furnish all the labor and material to install a complete safety and security system in the new building. The system shall include all items of work as outlined in these specifications and on the drawings.
- C. All work shall be performed by a well-qualified and licensed technician with a thorough knowledge of the various systems involved in this building. It shall be this contractor's responsibility to see that their electricians are familiar with all the various codes and tests applicable to this work.
- D. All equipment shall be new and of the type specified by the engineer unless otherwise noted in these specifications or on the drawings to remain and or be reused.
- E. The intent of the specifications and drawings is for complete installation of the systems outlined in the specifications and drawings so that at the conclusion of construction the system will be turned over to the owner complete and ready for safe and efficient operation.
- F. This contractor is required to furnish and install all such items normally included on systems of this type, which, while not mentioned directly herein or on the drawings are obviously essential to the installation and operation of the system and which are normally furnished on quality installation of this type. The specifications and drawings cannot deal individually with the many minute items that may be eventually required by the nature of the systems.
- G. This contractor, shall before proceeding with any work, review the architectural drawings. Any conflict between the technology and architectural drawings shall be reported to the engineer for clarification.

- H. If there is a discrepancy between the drawings and the specifications or within either document, the more stringent requirement shall be estimated unless brought to the engineer's attention and an addendum is issued for clarification.
- I. The Safety and Security Contractor shall establish system elevations prior to fabrication and installation. The Safety and Security Contractor shall coordinate elevations with other trades. All elevations shall be coordinated with all trades in the field prior to installation. When a conflict between trades arises, the design team shall be notified immediately prior to further installation however priority shall be as follows:
 - 1. Lighting Fixtures
 - 2. Gravity flow piping, including steam and condensate.
 - 3. Electrical bus duct.
 - 4. Sheet metal.
 - 5. Cable trays, including access space.
 - 6. Other piping.
 - 7. Conduits and wireway.
- J. Low Voltage Cable Installation
 - 1. This contractor is to install if they are licensed to, or contract with a licensed electrician to install conduit serving low voltage cables located in all mechanical rooms and non-accessible areas and exposed structural areas. Use cable trays in other areas as indicated on the drawings. Where cable trays are not accessible, use J-hooks equal to Cablofil or Caddy Cable CAT. No cable shall be allowed to lie on accessible ceilings tiles. Provide sleeves between walls and accessible clouds. Provide hooks with closure holes and cable ties. Mount hooks 3 feet on center.
- K. Trenching and Backfilling
 - 1. Each contractor is responsible for their own individual trenching and backfilling unless otherwise noted in the drawings or addendum.
 - 2. All underground utilities, telephone conduit, parking lot lighting, tunnels, etc shall be exactly located prior to digging. This contractor shall be held responsible for all damages caused by failure to do so.
 - 3. Any backfill shall be tamped and compacted to prevent future settling. The backfill shall be installed to a smooth and level grade and installed in accordance with local codes.
 - 4. All excess dirt shall be cleared from the area and disposed of as directed by the owner.
 - 5. Refer to architectural specification sections for additional information.

1.21 DAILY HOUSEKEEPING AND CLEANING

- A. At the end of each workday, the contractor shall remove all of their debris, rubbish, tools, and surplus materials from the project work area. The work area shall be broom cleaned and left in a neat and orderly condition. The contractor, for the removal of debris from the project, shall not use the owner's waste disposal facility.
- B. At end of construction, all equipment shall be cleaned and the premises left in first class condition as far as this contractor's work is concerned.

1.22 WALL CONTINUITY (1 HR.)

- A. All items mounted in 1 hr. rated walls requiring an opening larger than a four inch (4") square (16 sq. inches) require the 1 hr. rating not be degraded.
- B. Any branch panel in a 1 hr. wall will require the exterior of the recessed panel be covered with 5/8 inch fire rated gypsum board. This is true for any device requiring more than a 16 sq. inch opening.

1.23 CABLE

- A. The fire alarm system manufacturer shall approve low voltage cable. All low voltage electrical cable, installed as part of a new fire alarm system, shall be plenum rated cable.
- B. Cable installed without using raceway shall be neatly routed and supported every 3 feet by no less than a nylon wire tie or supported in bridle rings. All wiring in mechanical rooms shall be in

conduit. All exposed wiring shall be in raceways. No cable shall be allowed to lie on the accessible ceiling tile.

1.24 DIGITAL MEDIA AGREEMENT

- A. Computer Aided Drafting (CAD) Documents may be available to the contractor for some uses. Contact the engineer prior to bidding to determine what information is available to be transmitted to the contractor in digital form.
- B. When documents are determined to be available, and as requested by the contractor, they will be transmitted upon the completion and execution of the MODUS digital media agreement. A service fee for each document transmitted will be assessed to the contractor. Documents will be transmitted upon payment receipt. Current service fee is \$100.00 per CAD sheet.

1.25 SECURE NETWORKABLE DEVICES

- A. Update network devices to the most current software/firmware.
- B. Change default password of all networkable devices.
 - 1. Passwords shall have at least eight characters.
 - 2. Include uppercase and lowercase letters, numerals, and special characters
- C. Supply MAC address and serial number of all networkable devices.
- D. Work with the Owner's IT department to align to existing IT standards.
- E. Provide to the owner a printed and/or electronic spreadsheet log of all network information including, IP addresses, MAC addresses, logins and password information during system training.

1.26 SYSTEM CONFIGURATION AND PROGRAMMING FILES

- A. Supply system configuration and programming files where export is available.
- B. Supply uncompiled programming for systems applicable.
- C. All configuration and programming shall be property of the owner at conclusion of the project.

1.27 COMMISSIONING REQUIREMENTS

- A. Vendors / Subcontractors
 - 1. Provide all requested submittal data, including detailed startup procedures and specific responsibilities of the owner to keep warranties in force.
 - 2. Assist in equipment testing per agreements with subcontractors and/or contractor.
 - 3. Include cost of all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing, operating, and maintaining equipment according to these contract documents in the base bid price to the contractor.
 - 4. Analyze specified products and verify that the A/E has specified the newest, most current equipment reasonable for this project's scope and budget.
 - 5. Provide requested information regarding equipment sequence of operation and testing procedures.
 - 6. Review construction checklists and test procedures for equipment installed by factory representatives.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION 28 0050

SECTION 28 1300
ACCESS CONTROL SYSTEM (EXISTING)

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Access control system field hardware
- B. Electrical power requirements

1.02 RELATED SECTIONS

- A. Specification Section 08 7100 - Door Hardware
- B. Specification Section 26 0433 - Raceways and Boxes for Electrical Systems
- C. Specification Section 26 0519 - Electrical Power Conductors and Cables for Electrical Systems
- D. Specification Section 26 0526 - Grounding and Bonding for Electrical Systems

1.03 REFERENCES

- A. ADA - Accessibility Guidelines for Buildings and Facilities
- B. NFPA 70 - National Electrical Code
- C. NFPA 72 - National Fire Alarm and Signaling Code
- D. IBC International Building Code

1.04 SUMMARY

- A. Alarm system shall be an extension of the owner's existing Honeywell Ademco Vista-20P. New duress buttons shall tie to this system for reporting and dial out.
- B. Access control system shall be an extension of the owner's existing Millennium Access Control System.
- C. The access control system shall manage the security operations for multiple sites. It shall consist of all the software and hardware necessary to provide access control and alarm monitoring either from a workstation on the local area network or remotely, utilizing the internet.
- D. The system shall be capable of monitoring all alarm events and displaying them to a system operator. It shall also be capable of granting or denying access without the need for real time communications with the control panels.
- E. The system shall be designed such that entry/exit points may be added in one, two, four or eight door increments.
- F. A telephone entry controller shall be an integral part of the access control system, and shall be programmable from the access control software. A data history log shall be recorded and viewable at a later date.
- G. Utilize an open architecture where all data must reside on a single database and must be accessible in real time to SMS workstation or Web-based client connected to the network. All software and licensing necessary for full system functionality shall be included as part of this solution.

1.05 GENERAL REQUIREMENTS

- A. The drawings and specifications indicate the intent and direction of the installation. Items and their location are shown diagrammatic and are to be field verified by the contractor prior to completing work associated with the item.
- B. All work shall be performed in strict accordance with all applicable laws, ordinances, codes of local, state and federal government, or other authorities having lawful jurisdiction. The contractor is required to verify all requirements.
- C. The contractor shall furnish all required labor, material, and associated tools to facilitate the installation of all the audio and video equipment associated items specified herein and with respect to the design drawings without damage to the cables, associated items, and/or facilities.

- D. Qualified personnel, utilizing state-of-the-art equipment and techniques shall complete all installation work.
- E. All materials shall be installed in accordance with the manufacturer's specified recommendations and practices.

1.06 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Reference each product to a location on Drawings.
 - 1. Manufacturer's technical data for all material and equipment at the system and sub system level to be provided as part of the ACS.
- B. Shop Drawings: Submit plans, elevations, sections, details, and attachments to other work.
 - 1. Indicate all system device locations on architectural floor plans. No other system(s) shall be included on these plans.
 - 2. Include full schematic wiring information on these drawings for all devices. Wiring information shall include cable type, conductor routings, quantities, and connection details at device.
 - 3. Include a complete ACS one-line, block diagram.
 - 4. Include a statement of the system sequence of operation.
- C. Operation and Maintenance Data: For electronic security system to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 01 78 23, include the following:
 - 1. Provide one (1) set electronic format manuals including operating instructions, maintenance recommendations and parts list including wiring and connection diagrams modified to reflect as-built conditions.
 - 2. Manuals: Deliver final copies of the manuals within thirty (30) days after completing the installation test.
 - 3. The basics of the manuals shall include the following:
 - a. The contents of the manual identified on the cover.
 - b. Include names, addresses, and telephone numbers of the Contractor responsible for the installation and maintenance of the system and the factory representatives for each item of equipment for the system.
 - c. The manuals shall have a table of contents and labeled sections. The final copies delivered after completion of the installation test shall include all modifications made during installation, checkout, and acceptance testing.
 - 4. There shall be a set of Functional, Hardware, and Software manuals.
 - 5. The functional manual shall identify the operational requirements for the system and explain the theory of operations, design philosophy, and specific functions. Include a description of hardware and software functions, interfaces, and requirements.
 - 6. The hardware manual shall describe the equipment furnished including:
 - a. General description and specifications
 - b. Installation and check out procedures
 - c. Equipment layout and electrical schematics to the component level
 - d. Alignment and calibration procedures
 - e. Manufacturer's repair parts list indicating sources of supply.
 - 7. The software manual shall describe the functions of software and include all other information necessary to enable proper loading, testing, and operation. This manual shall include:
 - a. Definition of terms and functions.
 - b. System use and application software.
 - c. Initialization, startup, and exit.
 - d. Reports generation.
 - e. Details on forms customization and field parameters.

8. As-Built Drawings: During system installation, the Contractor shall maintain a separate hard copy set of drawings and wiring diagrams of the ACS to be used for record drawings. This set shall be accurately kept up to date by the Contractor with all changes and additions to the ACS. Copies of the final as-built drawings shall be provided to the end user in an acceptable AutoCAD (DWG/DXF) format.
9. Provide a yearly cost of any Software Subscription Agreement SSA associated with the licensing of the software.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 1. ACS manufacturer shall be an established organization with referenced and documented experience delivering and maintaining SMS of equal or higher sophistication and complexity as compared to the system detailed in this specification.
 2. ACS manufacturer shall employ at a minimum the following methods for quality assurance of component and assembly devices.
 - a. Perform visual inspection of devices to verify assembly according to defined procedures. Perform end of line operational tests to ensure product functionality has been correctly configured.
 3. Perform individual functionality and system level regression testing to ensure compliance with product specifications. Perform single and multiple unit system tests to mimic end-user installation configurations. Utilize automated hardware and software testing to evaluate system performance under published operational loads and compare to published system capabilities.
- B. Bidder Qualifications:
 1. At the time of the bid, the bidder shall have satisfactorily completed projects of a similar size, scope, and complexity as the system detailed in this specification. The bidder shall furnish written proof of experience from three (3) references and proof of current accreditation or certification by the manufacturer for required training for sales or installation or service of the ACS and associated devices.
 2. The bidder shall also be a factory authorized local service organization that shall carry a complete stock of parts and provide maintenance for the SMS and related systems under this contract. Local shall be defined as an area in a 125 mile radius of the installed location.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Match existing Millennium hardware
- B. No Engineer approved equal.

2.02 ACCESS CONTROL SYSTEM FIELD HARDWARE

- A. Access Control System (ACS) Hardware: The ACS shall be equipped with the access control field hardware required to receive alarms and administer all access granted or denied decisions. This shall include but not be limited to: intelligent system controllers (ISC), reader controllers and general purpose input/output panels. All field hardware must be designed to meet UL 294 requirements. The ACS must be able to retrieve device serial numbers from all field hardware, excluding card readers, biometric readers, and keypads.
- B. ACS Authentication Hardware:
 1. Contactless smartcard reader – multi-technology, mobile ready standalone credential readers:
 - a. HID® Signo Reader 20 Mullion Mounted
 - b. HID® Signo Reader 40 Single gang mounted
 - c. Engineer Approved Equal
 - d. Refer to drawings and locations and quantities.
- C. Door control panel
 1. Alarm Controls CP-24AB.

2. Coordinate programming with owner.
 - a. button press shall unlock assigned door.
 - b. button shall light for the duration of unlock on all panels.
 - c. button shall be able to do either a timed unlock or toggled unlock as coordinated with owner.
3. Panel shall be no more than 2 gang.
4. Buttons shall have engraved label as coordinated with the owner.
5. Contractor shall provide desk mounting box equivalent to FSR DSKB-2G.

2.03 ELECTRICAL POWER REQUIREMENTS

- A. System Power: The security management system shall operate using standard 120 volts AC power.
- B. Battery Backup: A rechargeable 12VDC, gel-type, lead acid battery backup shall be provided for all intelligent system controllers, reader controllers, and general purpose input/output panels.
- C. Provide a centralized power supply for all electronic locking hardware with the exception of all electrified panic bar locations. Coordinate power supply quantities with division 08 7100.
 1. Altronix
 2. Engineer approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Submittals for review by design team confirms that the contract documents and site conditions are accepted without qualifications unless exceptions are specifically noted.
- B. The site shall be visited on a regular basis to appraise ongoing progress of other trades and contracts, make allowances for all ongoing work, and coordinate the requirements of this contract in a timely manner.
- C. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of electronic security system.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 SYSTEM INTEGRATION

- A. Integrate electronic security system with the following systems and equipment:
 1. Electronic door hardware
 2. Fire Alarm

3.03 INSTALLATION

- A. Install system in accordance with manufacturer's installation instructions. The following conditions are applicable:
 1. In order to ensure a complete, functional system, for bidding purposes, where information is not available from the owner upon request, the worst-case condition shall be assumed.
 2. Interfaces shall be coordinated with the owner's representative, where appropriate.
 3. All necessary back boxes, pull boxes, connectors, supports, conduit, cable and wire shall be furnished and installed to provide a complete and reliable system installation. Exact location of all devices and wiring shall be presented to the owner for approval in advance of any installation.
- B. The contractor shall install all system components and appurtenances in accordance with the manufacturer's instructions, and shall furnish all necessary interconnections, services, and adjustments required for a complete and operable system as specified and shown. Control signal, communications, and data transmission line grounding shall be installed as necessary to preclude ground loops, noise, and surges from adversely affecting system operation. Provide mounting hardware as required.
- C. All inputs shall be protected against surges induced on device wiring. Outputs shall be protected against surges induced on control and device wiring installed outdoors and as shown. All communications equipment shall be protected against surges induced on any communications

circuit. All cables and conductors which serve as communications circuits from security console to field equipment, and between field equipment, shall have surge protection circuits installed at each end.

- D. Connect each field device with owner's data network as required. Coordinate each connection type and requirement with structured cabling contractor.
- E. Wiring Method: Install wiring in metal raceways, except in accessible spaces and in interior hollow gypsum board partitions where cable may be used. Minimum conduit size shall be 1/2-inch. Control and data transmission wiring shall not share conduit with other building wiring systems.

3.04 CABLE

- A. The access control system manufacturer shall approve and install the low voltage cable. All low voltage electrical cable that is installed as part of the access control system shall be plenum rated cable where required.

3.05 TESTING AND CERTIFICATION

- A. This contractor shall demonstrate the functionality of the system, as defined by the matrix of responsibility on the plans and section 08 7100, upon completion of installation, documenting the result of all tests and providing these results to the owner. The system shall be tested in accordance with the following:
 - 1. This contractor shall conduct a complete inspection and test of all installed equipment. This includes testing and verifying connection to equipment of other divisions.
 - 2. This contractor shall provide staff to test all devices and all operational features of the system for witness by the owner's representative. The contractor shall provide two-way radio communications to assist in the testing. The owner's representative, prior to acceptance, must witness all testing.
- B. The testing and certification shall take place as follows:
 - 1. System shall be tested in conjunction with the manufacturer's representative.
 - 2. All deficiencies noted in the above test shall be corrected.
 - 3. Test results shall be submitted to the consultant or owner's representative.
 - 4. System test witnessed by owner's representative and correction of any deficiencies noted.
 - 5. The owner's representative shall accept the system.
 - 6. A letter of certification shall be provided to indicate that the tests have been performed and all devices are operational.

3.06 FIELD QUALITY CONTROL

- A. Test in accordance with NFPA 72.

3.07 WARRANTY

- A. This contractor shall guarantee all of the apparatus, materials, equipment furnished, and labor installed under this contract for a period of one year after date of final acceptance.

3.08 MANUFACTURER'S LICENSING CONTRACT

- A. This contractor shall update and maintain all system licensing of the installed hardware under this contract for a period of one year after date of final acceptance.

END OF SECTION 28 1300

SECTION 28 2300
VIDEO SURVEILLANCE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Existing DVMS
- B. IP cameras
- C. Ethernet network

1.02 RELATED SECTIONS

- A. Specification Section 26 0533 - Raceway and Boxes for Electrical Systems
- B. Specification Section 28 1300 - Access Control

1.03 REFERENCES

- A. NFPA 70 - National Electrical Code.

1.04 SYSTEM DESCRIPTION

- A. Contractor shall install new cameras and licensing on existing Exacqvision security camera server.
- B. Security contractor shall work in coordination with structured cable contractor to move existing cameras on to new telecom rack switching hardware.
- C. The Digital Video Management Solution (DVMS) shall be a hardware-based solution with preloaded software designed for scalable installations that may consist of multiple sites and, therefore, utilize multiple Network Video Recorders (NVRs) to run the deployment.
- D. The preloaded software shall be quick and easy to set up and manage. The solution shall use system configuration wizards and have functionality to detect hardware. The system shall support devices from different vendors.
- E. The software solution shall allow an unlimited number of cameras to be connected when used with client software.

1.05 GENERAL REQUIREMENTS

- A. The drawings and specifications indicate the intent and direction of the installation. Items and their location are shown diagrammatic and are to be field verified by the contractor prior to completing work associated with the item.
- B. All work shall be performed in strict accordance with all applicable laws, ordinances, codes of local, state and federal government, or other authorities having lawful jurisdiction. The contractor is required to verify all requirements.
- C. The contractor shall furnish all required labor, material, and associated tools to facilitate the installation of all the audio and video equipment associated items specified herein and with respect to the design drawings without damage to the cables, associated items, and/or facilities.
- D. Qualified personnel, utilizing state-of-the-art equipment and techniques shall complete all installation work.
- E. All materials shall be installed in accordance with the manufacturer's specified recommendations and practices.

1.06 SUBMITTALS

- A. Shop Drawings: Indicate electrical characteristics and connection requirements, including system wiring diagram.
- B. Product Data: Provide showing electrical characteristics and connection requirements for each component.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

- D. Calculations for days of retention at a level of resolution.
- E. Programming and any special features for this project, i.e. mapping.
- F. Information regarding accessories providing ties to other systems.

1.07 PROJECT RECORD DOCUMENTS

- A. Record the actual locations and routing of cameras and cabling.
- B. Record Patch Panel port, and network port of camera and cabling.
- C. Record IP address, Mac Address, and camera log on information.
- D. Record and turn a copy over to owner of DVMS configuration files, log in information, and system documentation.

1.08 OPERATION AND MAINTENANCE DATA

- A. Operation Data: Instructions for starting and operating system.
- B. Maintenance Data: Routine trouble shooting procedures.

1.09 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years experience and with service facilities within 100 miles of project.
- B. Supplier: Authorized distributor of specified manufacturer with three years (minimum) experience.
- C. Installer: Authorized installer of specified manufacturer with service facilities within 100 miles of project.

1.10 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and indicated.

1.11 MAINTENANCE SERVICE

- A. Furnish service and maintenance of DMVS system for one year from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 EXISTING DVMS

- A. Manufacturers:
 - 1. Expand existing ExacqVision

2.02 IP CAMERAS

- A. Manufacturers:
 - 1. Axis
 - 2. Engineer approved equal.
- B. Refer to drawings and schedules for camera models & locations.

2.03 ETHERNET NETWORK

- A. Owner provided network
 - 1. See Specification Section 27 1005 Telecommunications Cable Infrastructure for cabling.
 - 2. Coordinate all Network IP, VLAN, and Network security requirements with Owner to meet security compliance.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install system in accordance with manufacturer's installation instructions. The following conditions are applicable:

1. In order to ensure a complete, functional system, for bidding purposes, where information is not available from the owner upon request, the worst-case condition shall be assumed.
 2. Interfaces shall be coordinated with the owner's representative, where appropriate.
 3. 3. All necessary back boxes, pull boxes, connectors, supports, conduit, cable and wire shall be furnished and installed to provide a complete and reliable system installation. Exact location of all devices and wiring shall be presented to the owner for approval in advance of any installation.
- B. The contractor shall install all system components and appurtenances in accordance with the manufacturer's instructions, and shall furnish all necessary interconnections, services, and adjustments required for a complete and operable system as specified and shown. Control signal, communications, and data transmission line grounding shall be installed as necessary to preclude ground loops, noise, and surges from adversely affecting system operation. Provide mounting hardware as required.
- C. All inputs shall be protected against surges induced on device wiring. Outputs shall be protected against surges induced on control and device wiring installed outdoors and as shown. All communications equipment shall be protected against surges induced on any communications circuit. All cables and conductors which serve as communications circuits from head end to field equipment, and between field equipment, shall have surge protection circuits installed at each end.
- D. Connect each field device with owner's data network as required. Coordinate each connection type and requirement with structured cabling contractor.
- E. Wiring Method: Install wiring in metal raceways, except in accessible spaces and in interior hollow gypsum board partitions where cable may be used. Minimum conduit size shall be 1/2-inch. Control and data transmission wiring shall not share conduit with other building wiring systems.

3.02 INTERFACE WITH OTHER PRODUCTS

- A. Interface installation of DMVS with security access and intrusion detection systems.

3.03 ADJUSTING

- A. All camera's will be in focus and iris adjusted to meet lighting conditions.
- B. All camera views will be coordinated and approved by owner.
- C. Screen capture from camera.

3.04 TESTING AND CERTIFICATION

- A. This contractor shall demonstrate the functionality of the system upon completion of installation, documenting the result of all tests and providing these results to the owner. The system shall be tested in accordance with the following:
1. This contractor shall conduct a complete inspection and test of all installed equipment. This includes testing and verifying connection to equipment of other divisions.
 2. This contractor shall provide staff to test all devices and all operational features of the system for witness by the owner's representative and the authority having jurisdiction. The contractor shall provide two-way radio communications to assist in the testing. The owner's representative, prior to acceptance, must witness all testing.
- B. The testing and certification shall take place as follows:
1. System shall be tested in conjunction with the manufacturer's representative.
 2. All deficiencies noted in the above test shall be corrected.
 3. Test results shall be submitted to the consultant or owner's representative.
 4. System test witnessed by owner's representative and correction of any deficiencies noted.
 5. The owner's representative shall accept the system.
 6. System test shall be witnessed by the authority having jurisdiction, and any deficiencies that are noted shall be corrected.
 7. A letter of certification shall be provided to indicate that the tests have been performed and all devices are operational.

3.05 DEMONSTRATION

- A. The contractor shall conduct training courses for personnel designated by the owner. Training shall cover all facets of maintenance and operation of the security management system. The training shall be oriented to the specific system being installed under this contract.
- B. Training manuals shall be delivered for each trainee with two additional copies delivered for archiving at the project site. The manuals shall include an agenda, defined objectives for each lesson, and a detailed description of the subject matter for each lesson. The contractor shall furnish audio visual equipment and other training materials and supplies as necessary.
- C. Where the contractor presents portions of the course by audio visual material, copies of the presentation material shall be delivered to the owner on the same media as that used during the training session. Up to four hours of training shall be provided for in the base contract.
- D. Training will consist at a minimum of:
 - 1. Log on the system.
 - 2. Add/Remove users
 - 3. Adding/Remove a camera
 - 4. Viewing live cameras
 - 5. Viewing recorded footage
 - 6. Exporting recorded footage
 - 7. Basic Server functions and operations
 - 8. Basic Viewer/Client functions and operations
 - 9. Demonstration of network security features (Passwords, AD integration)

END OF SECTION 28 2300

SECTION 28 3100
FIRE DETECTION AND ALARM (EXISTING/REMODELING)

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire alarm and smoke detection control panel
- B. Peripheral devices
- C. Fire alarm wire and cable
- D. Fire/smoke dampers
- E. Sprinkler flow and tamper switch
- F. Remote annunciator panel
- G. Monitor and control modules

1.02 RELATED SECTIONS

- A. Specification Section 08 7100 - Door Hardware
- B. Specification Section 21 1300 - Fire Suppression Sprinkler System
- C. Specification Section 21 2000 - Fire Extinguishing System
- D. Specification Section 26 0533 - Raceways and Boxes for Electrical Systems

1.03 REFERENCES

- A. NFPA 70 - National Electrical Code
- B. NFPA 72 – National Fire Alarm Code
- C. NFPA 101 - Life Safety Code
- D. International Building Code
- E. International Existing Building Code
- F. International Fire Code
- G. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems

1.04 SYSTEM DESCRIPTION

- A. Fire Alarm System: NFPA 72, manual and automatic local fire alarm system.
- B. Fire alarm system shall include the system wiring, raceways, pull boxes, terminal cabinets, outlet and mounting boxes, control equipment, alarm and supervisory signal initiating devices, alarm notification appliances and other accessories required for a complete operating system.

1.05 SUBMITTALS

- A. Shop Drawings: Provide a building layout showing each device and wiring connection required.
- B. Product Data: Provide electrical characteristics and connection requirements.
- C. Test Reports: Indicate satisfactory completion of required tests and inspections.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation and starting of products.
- E. Contractor shall submit software logic, flow diagrams, battery calculations and one line diagrams illustrating device loops.
- F. Contractor shall be responsible for submitting a copy of these documents to the local Authority Having Jurisdiction or state for required review.
- G. Submit copies of NICET certifications as described in this specification section.

1.06 PROJECT RECORD DOCUMENTS

- A. Record actual locations of initiating devices, signaling appliances, shut down relays, power supplies, and end-of-line devices.
- B. Indicate device addresses on this drawing.
- C. Deliver to owner as both hard copy and electronic file.

1.07 OPERATION AND MAINTENANCE DATA

- A. Operation Data: Operating instructions.
- B. Maintenance Data: Maintenance and repair procedures.
- C. Configuration Data: Printouts of configuration settings for all devices.
- D. Routine Maintenance Checklist.

1.08 QUALIFICATIONS

- A. Contractor: The contractor shall have a fully equipped, factory trained, and manufacturer certified service and installation organization.
- B. Supervisor: The job supervisor shall be a NICET Level II (or higher) technician and be a full-time employee of the certified reseller. Supervisor shall be responsible for programming and testing.
- C. A job site supervisor is to be present on-site at all times during installation. The supervisor shall be a NICET Level II (or higher) technician.
- D. Installer: All work relating to the fire alarm shall be performed by a NICET Level I (or higher) technician.
- E. A list of technicians with any level of responsibility with this project shall be submitted for review and acceptance during the submittal process. A copy of their NICET Certification and manufacturer's training certificate for the system to be installed shall also be included.
- F. Installer shall be capable of answering trouble calls from a permanently maintained location less than 100 miles from project site.

1.09 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70 and NFPA 101.
- B. Furnish products listed and classified by UL, FM as suitable for purpose specified and indicated.

1.10 EXTRA LABOR AND MATERIALS

- A. Provide 1 (one) installed manual stations including 40 feet of wiring to be positioned by the owner or engineer.
- B. Provide 1 (one) installed automatic smoke detectors including 40 feet of wiring each per device to be positioned by the owner or engineer.
- C. Provide 1 (one) installed automatic heat detectors including 40 feet of wiring each per device to be positioned by the owner or engineer.
- D. Provide 1 (one) installed audible/visual alarms including 40 feet of wiring each per device to be positioned by the owner or engineer.
- E. Provide a minimum of six keys of each type.
- F. Devices not installed at the direction of the owner or engineer shall be turned over to the owner at the completion of the project.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Match existing. Firelite MS-9200UDLS
- B. No engineer approved equal.

2.02 FIRE ALARM AND SMOKE DETECTION CONTROL PANEL

- A. Main Control Panel: Existing panel to remain. Expand panel as necessary to provide sufficient initiating and indicating circuits.
- B. Test and verify automatic telephone dialer module. Notify the design team of any issues.

2.03 PERIPHERAL DEVICES

- A. Manual Fire Alarm Station: Fire alarm pull stations semi-flush compatible with existing fire alarm control panel.
- B. Thermo-Detectors: Area thermo-detectors shall be 135 deg F rate of rise and fixed. They shall cover 2500 sq. ft. Detectors shall be compatible with existing fire alarm control panel.
- C. Automatic Smoke Detectors: Area smoke detectors shall operate on the photo-electric principle using a stable LED light source and a silicone photodiode to form a very highly accurate means of smoke detection and shall be so designed for a 360 degree smoke entry for optimum response. Regardless of sensitivity setting the detector stability shall be unaffected by high air velocity. Detectors shall be compatible with existing fire alarm control panel.
- D. Horn/Strobe Indicators: Wall mounted shall comply with Americans with Disabilities Act and compatible with existing fire alarm control panel.
- E. Horn/Strobe Combination Unit: Flush mounted combination unit with red thermoplastic faceplate, "FIRE" in white letters.
- F. Strobe Only Unit: Xenon light.
- G. Fire Door Hold Opens:
 - 1. Door Release Type: Door closers shall be furnished and installed by the general contractor and wired by electrical contractor in a separate raceway.
 - 2. Magnetic Type: Furnish and install where indicated on the drawings.
 - 3. Door closers shall be controlled by the fire alarm panel control modules that release the 120 volt door holder magnets. Verify voltage with the general contractor.
- H. Duct Smoke Detectors: Furnish and install duct smoke detectors in supply and return air ducts for all the air handling units with fan shutdown relays. Provide remote key re-sets for these detectors.
- I. Elevator Shunt Trip Breaker: Fire alarm contractor shall monitor electrical contractor provided elevator shunt trip breaker. Refer to elevator detail on drawings.

2.04 FIRE ALARM WIRE AND CABLE

- A. Fire Alarm Power Branch Circuits: Building wire as specified.
- B. Initiating Device and Indicating Appliance Circuits: All fire alarm wiring shall be in metallic conduit or open raceway system as specified. Concealed in finished area. Wiring shall be as specified by the manufacturer.
- C. Total load carrier by conductors in each conduit at any voltage shall be limited to 5 amperes. Voltage above 30 VAC-DC shall be in a separate conduit. Wire shall be color coded as follows:
 - 1. Detector Power Circuit: Violet (+) and Blue (-)
 - 2. Signal Circuit: Red (+) and Black (-)
 - 3. Fan Shutdown Circuit: Brown (+), White (-) and Green for ground.

2.05 FIRE/SMOKE DAMPERS

- A. When duct smoke detection is furnished by mechanical contractor. Electrical contractor shall provide and install 110 volt wiring for smoke dampers. Fire alarm contractor shall provide and install Monitor Module at each fire/smoke damper or smoke damper. Fire alarm contractor shall coordinate signal from Fire Alarm panel to HVAC control system to shut down associated units.
- B. Where a damper is installed within an un-ducted opening in a wall, a smoke detector shall be installed within 5 feet of the damper.
- C. Dampers shall be controlled by the fire alarm system via addressable relays that interrupt power to the damper. Dampers shall close when power is removed. Direct control from duct detector

relays is not allowed. One fire alarm addressable relay may control multiple dampers but shall only be grouped for the same air handling unit equipment. Damper power circuit shall be on the same electrical branch as the associated air handling equipment, when on emergency power, the same transfer switch shall serve the air handling equipment and associated dampers

- D. Dampers shall close when associated air handling equipment is shut down. A relay provided by the T.C.C. shall initiate damper closure through a dedicated fire alarm monitor module. Fire alarm programming shall associate monitor module(s) with respective damper operation.
- E. Dampers that close more than 80% of air from an air handling unit (AHU) shall be interlocked with AHU shutdown programming and shall provide an appropriate delay to allow sufficient time (usually 120 seconds) to allow AHU fans to slow down prior to damper closure to prevent high-static pressure trips. Delays shall be initiated by the building automation system, provide additional control relays to achieve delays and inhibit signals.
- F. All smoke damper circuits shall be dedicated.
- G. Refer to mechanical and electrical drawings for smoke damper locations.
- H. Furnish and install a momentary test switch at each fire/smoke and smoke damper to allow proof of damper operation.

2.06 SPRINKLER FLOW AND TAMPER SWITCH

- A. This contractor is responsible to wire all flow switches and provide tamper switches on all valves provided by the sprinkler contractor.

2.07 REMOTE ALARM ANNUNCIATOR PANEL

- A. Furnish and install where indicated on the drawings a remote annunciator panel. Panel shall provide alarm/trouble/reset capabilities to match main control panel information and features.

2.08 MONITOR AND CONTROL MODULES

- A. This contractor is responsible to provide all necessary components and wiring for service to approved HVAC equipment 2000 cfm (and larger), approved kitchen hoods and approved fire suppression services. Coordinate exact requirements with HVAC, kitchen equipment, and fire suppression contractors.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install manual station with operating handle 48 inch on center above finished floor. Install audible and visual signal devices 80 inches above floor or six inches (6") below ceiling, whichever is lower in compliance with ADA standards.
- C. Make conduit and wiring connections to door release, devices, sprinkler flow switches, and sprinkler valve tamper switches. This contractor is responsible for all wiring and conduit to the sprinkler system post indicating valve, when this valve is provided. See drawings for location.
- D. Automatic Detector Installation: Conform to NFPA 72.
- E. This contractor shall relocate all existing devices from existing ceilings and mount on new ceilings. New ceilings are indicated on the drawings.
- F. Provide telephone wire from fire alarm panel to owner's telephone system. Final connection is to be by the owner.
- G. Detector should not be located in areas with excessive exhaust fumes, kitchen areas, near fireplaces or furnace rooms and within three feet (3') of air supply ducts, air diffusers, or ceiling fans.
- H. This contractor shall be responsible for installing an indication system that results in a tone reaching 15 dB over ambient or louder. Horns shall not reach a volume that is greater than 105dB in any room.

- I. This contractor shall be responsible for installing an indication system that meets or exceeds the required strobe intensity per NFPA 72.
- J. Coordinate with design team to ensure signage is provided per code on door of room housing the Fire Alarm Control Panel.
- K. Existing devices may be reused where appropriate.
- L. This contractor is responsible to provide all necessary components and wiring for service to approved HVAC equipment 2000 cfm (and larger), approved kitchen hoods and approved fire suppression services. Coordinate exact requirements with HVAC, kitchen equipment, and fire suppression contractors.

3.02 ELECTRICAL REQUIREMENTS

- A. All wiring shall be concealed within walls. No exposed raceways except areas with exposed structure. Coordinate conduit routing with the architect. Provide conduit for wiring located in non-accessible areas. In areas with accessible ceilings, use j-hooks as specified. Provide sleeves through walls and floors (3/4 inch minimum). Do not exceed a 40% pipe fill.
- B. Minimum 3/4 inch conduit size.
- C. Fire alarm cable installed in conduit shall not be shared by any other low voltage system cable.
- D. Make conduit and wiring connections to door release devices, sprinkler flow switches, and sprinkler valve tamper switches. This contractor is responsible for all wiring and conduit to the sprinkler system post indicating valve, when this valve is provided. See drawings for location.
- E. Provide and Install insulated bushing on end of raceways.
- F. All fire alarm devices, junction and pull boxes shall be installed so they are easily accessible without removing light fixtures, equipment, conduits, junction boxes or other items.
- G. Provide locking breaker on 120 VAC power source and label "Fire Alarm." Locking breaker shall be painted red. Any power source to FACP or devices shall be labeled with location of Power source for room number, panel and circuit number.
- H. Fire alarm control and remote power panel's power shall be supplied by a surge protected dedicated circuit(s).
- I. Auxiliary functions that are powered from a remote source must be monitored for power if they do not go to the operational mode for fire protection. (i.e. A power opener purge door that must open to purge air through building or a stairway air pressurization fan that must be monitored for power in case the breaker is shut off.)

3.03 FIELD QUALITY CONTROL

- A. Test in accordance with NFPA 72.
- B. Upon completion of the fire alarm system installation, this contractor shall provide a written statement advising the architect of completion and to be in compliance with fire and electrical codes and in accordance with wiring diagrams, instructions and directions provided by the manufacturer.
- C. Representative of the manufacturer shall certify the system complete and that the owner has received adequate instructions in system operation.

3.04 MANUFACTURER'S FIELD SERVICES

- A. Prepare and start system.
- B. Include services of certified technician to supervise installation, adjustments, final connections, and system testing.

3.05 ADA HEIGHT

- A. The new fire alarm devices will require new back boxes for the new audio/visual alarm signals. Install at the new ADA height of 80 inches to the center of the flashing light. ADA requires 48 inches to the operating mechanism of any pull station, which is newly installed in order to comply with a wheel chair bound person's forward reaching.

- B. The devices mounted below 80 inches shall not protrude from the wall over four inch (4") to comply with ADA.

3.06 CABLE

- A. The fire alarm system manufacturer shall approve the low voltage cable. All low voltage electrical cable that is installed as part of the new fire alarm system shall be plenum rated cable where required.
- B. The cable that is installed without using raceway shall be neatly routed and supported every three foot (3') by no less than a nylon wire tie or supported in bridge rings. All wiring in mechanical rooms shall be in conduit. All exposed wiring shall be in raceway. No cable shall be allowed to lie on the accessible ceiling tile.
- C. Cable associated with smoke control or stairwell pressurization systems shall be installed in continuous raceway.

3.07 EXISTING FIRE ALARM STATUS

- A. The electrical contractor shall document all alarms associated to the fire alarm system and contact owner prior to performing general demolition.
- B. Electrical contractor shall respond to and resolve any nuisance trouble conditions from fire alarm system due to related construction project. Nuisance troubles shall be resolved with maintenance staff within 24 hours of notification of trouble.

END OF SECTION 28 3100