PROJECT MANUAL

FOR

Carey Maintenance Building

OWNER
State of Idaho
Idaho Transportation Department
3311 State Street
Boise, Idaho 83707

Hutchison-Smith Architects
270 N. 27th Street A
Boise, Idaho 83702
(208) 338-1212

DATE: May 24, 2018
SPECIFICATION AND DETAIL MANUAL

MAINTENANCE BUILDING
ADDITION & REMODEL
CAREY, IDAHO
ITD # 18-402

Idaho Transportation Department
P.O. Box 7129
Boise, Idaho 83707

DATE: June 2018

ARCHITECT
Hutchison Smith Architects
270 N. 27TH St., Suite 202
Boise, ID 83702
Contact: Joe Preshrer
Tel: (208) 338-1212

MECHANICAL ENGINEER
Nielson Engineering
156 N. 12th Avenue
Pocatello, Idaho 83201
Contact: Gordon Nielson
Tel: (208) 232-2577

ELECTRICAL ENGINEER
Bradley Engineering, Chtd.
645 W. 25th Street
Idaho Falls, ID 83402
Contact: Andrew Yanoshek
Tel: (208) 523-2862 Fax: (208) 523-2864

STRUCTURAL ENGINEER
AHJ Engineers
5418 N. Eagle Road, #140
Boise, ID 83713
Contact: Keith Jones
Tel: (208) 323-0199 Fax:(208) 375-5251

LICENSED ARCHITECT
AR-1271
DON HUTCHISON
DONALD P. HUTCHISON
STATE OF IDAHO

PROFESSIONAL ENGINEER
STATE OF IDAHO
GORDON A. NIELSON
5634

PROFESSIONAL ENGINEER
STATE OF IDAHO
ANDREW YANOSHEK
16967
5-21-18

PROFESSIONAL ENGINEER
STATE OF IDAHO
DAVID W. HAUGLAND
8454
5-22-18
PART 1 GENERAL

1.01 SECTION INCLUDES
A. Identification of project team members and their contact information.

1.02 OWNER:
A. State of Idaho – Idaho Transportation Department – District #4
216 South Date Street
Shoshone, Idaho
(208) 886-7800

B. Primary Contact:
Shawn Webb
(208) 886-7800 – office
Shawn.Webb@itd.idaho.gov

1.03 Architect:
Hutchison-Smith Architects
270 N, 27th Street Suite A
Boise, Idaho 83702

Primary Contact:
Don Hutchison
(208) 338-1212
don@hsaarchitects.com

1.04 Construction Manager:
Petra, Incorporated
1097 N. Rosario Street
Suite 200
Meridian, Idaho 83642

Primary Contact:
Roy Jackson
(208) 323-4500 – office
rjackson@petrainc.net

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LEGAL NOTICE ADVERTISEMENT FOR BID; The ITD (Idaho Transportation Department) is soliciting sealed proposals for Construction Services for:

**Carey Maintenance Building Addition**

The project is located at North Main St. and US HWY 93, Carey, ID 83320.

**Proposals for will be received at the Idaho Transportation Department Headquarters, Business and Support Management Building at 3311 State Street, Boise, Idaho 83707 on Tuesday, June 12th, 2018 at 3:30 PM Local Time.**

**A Pre-Bid Conference will be held at the Site at 1:00 PM on Thursday May 31st, 2018 to discuss the work, address any concerns and provide opportunity to visually inspect the site and conditions of the work. Attendance is strongly encouraged. Bid Forms for the work are bound with the Project Manual. Shawn Webb, ITD Dist 4 Operations TSEA will conduct the tour. Cell phone 208-316-0470.**

Bidders are invited to attend a public bid opening where bids will be read aloud at the Idaho Transportation Department Headquarters, Business and Support Management Building at 3311 State Street, Boise, Idaho 83707, immediately following the closing time for receipt of bids. Owner reserves the right to reject any or all bids, or to waive informalities.

Bids must be accompanied by bid bond issued by an Idaho licensed surety company, or accompanied by a certified or cashier’s check from an Idaho Bank payable to the Owner in an amount not less than 5% of the total bid. This surety shall be forfeited by the Bidder should the Bidder fail to sign the contract or furnish the required 100% Performance and 100% Payment Bonds.


Bidder shall be licensed in the State of Idaho in accordance with Idaho State Public Works license law, Title 54 - Chapter 19 - Idaho Code Amended. Bidder shall comply with all Equal Employment Opportunity provisions required by federal regulations. Bidder shall be in compliance with State of Idaho Title 44 - Chapter 10, Idaho Code Amended as it relates to payment of wages and employment practices.
Instructions to Bidders

for the following PROJECT:
(Name and location or address)
Carey Maintenance Building Addition
Idaho Transportation Department
Carey, Idaho

THE OWNER:
(Name, legal status and address)
State of Idaho Transportation Department
3311 West State Street
Boise, Idaho 83707

THE ARCHITECT:
(Name, legal status and address)
Hutchison-Smith Architects
270 N. 27th Street Suite A
Boise, Idaho 83702

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

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.
ARTICLE 1 DEFINITIONS
§ 1.1 Bidding Documents include the Bidding Requirements and the proposed Contract Documents. The Bidding Requirements consist of the Advertisement or Invitation to Bid, Instructions to Bidders, Supplementary Instructions to Bidders, the bid form, and other sample bidding and contract forms. The proposed Contract Documents consist of the form of Agreement between the Owner and Contractor, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications and all Addenda issued prior to execution of the Contract.

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

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

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

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

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

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

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

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

ARTICLE 2 BIDDER'S REPRESENTATIONS
§ 2.1 The Bidder by making a Bid represents that:
§ 2.1.1 The Bidder has read and understands the Bidding Documents or Contract Documents, to the extent that such documentation relates to the Work for which the Bid is submitted, and for other portions of the Project, if any, being bid concurrently or presently under construction.

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

§ 2.1.3 The Bidder has visited the site, become familiar with local conditions under which the Work is to be performed and has correlated the Bidder's personal observations with the requirements of the proposed Contract Documents.

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

ARTICLE 3 BIDDING DOCUMENTS
§ 3.1 COPIES
§ 3.1.1 Bidders may obtain complete sets of the Bidding Documents from the issuing office designated in the Advertisement or Invitation to Bid in the number and for the deposit sum, if any, stated therein. The deposit will be refunded to Bidders who submit a bona fide Bid and return the Bidding Documents in good condition within ten days after receipt of Bids. The cost of replacement of missing or damaged documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the Bidding Documents and the Bidder's deposit will be refunded.

§ 3.1.2 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the Advertisement or Invitation to Bid, or in supplementary instructions to bidders.
§ 3.1.3 Bidders shall use complete sets of Bidding Documents in preparing Bids; neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

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

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

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

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

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

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

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

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

§ 3.4 ADDENDA
§ 3.4.1 Addenda will be transmitted to all who are known by the issuing office to have received a complete set of Bidding Documents.

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

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

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

ARTICLE 4 BIDDING PROCEDURES
§ 4.1 PREPARATION OF BIDS
§ 4.1.1 Bids shall be submitted on the forms included with the Bidding Documents.
§ 4.1.2 All blanks on the bid form shall be legibly executed in a non-erasable medium.

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

§ 4.1.4 Interlineations, alterations and erasures must be initialed by the signer of the Bid.

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

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder’s refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall make no additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 Each copy of the Bid shall state the legal name of the Bidder and the nature of legal form of the Bidder. The Bidder shall provide evidence of legal authority to perform within the jurisdiction of the Work. Each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent’s authority to bind the Bidder.

§ 4.2 BID SECURITY

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

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

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

§ 4.3 SUBMISSION OF BIDS

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

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

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

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

§ 4.4 MODIFICATION OR WITHDRAWAL OF BID

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

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

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

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

ARTICLE 5 CONSIDERATION OF BIDS
§ 5.1 OPENING OF BIDS
At the discretion of the Owner, if stipulated in the Advertisement or Invitation to Bid, the properly identified Bids
received on time will be publicly opened and will be read aloud. An abstract of the Bids may be made available to
Bidders.

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

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

§ 5.3.2 The Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically
provided in the Bidding Documents, and to determine the low Bidder on the basis of the sum of the Base Bid and
Alternates accepted.

ARTICLE 6 POST-BID INFORMATION
§ 6.1 CONTRACTOR’S QUALIFICATION STATEMENT
Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request, a properly
executed AIA Document A.305, Contractor’s Qualification Statement, unless such a Statement has been previously
required and submitted as a prerequisite to the issuance of Bidding Documents.

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

§ 6.3 SUBMITTALS
§ 6.3.1 The Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, after notification of
selection for the award of a Contract, furnish to the Owner through the Architect in writing:
  .1 a designation of the Work to be performed with the Bidder’s own forces;
  .2 names of the manufacturers, products, and the suppliers of principal items or systems of materials and
equipment proposed for the Work; and
  .3 names of persons or entities (including those who are to furnish materials or equipment fabricated to a
special design) proposed for the principal portions of the Work.

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

§ 6.3.3 Prior to the execution of the Contract, the Architect will notify the Bidder in writing if either the Owner or
Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner
or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder’s option, (1)
withdraw the Bid or (2) submit an acceptable substitute person or entity with an adjustment in the Base Bid or Alternate Bid to cover the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

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

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 BOND REQUIREMENTS

§ 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Bonds may be secured through the Bidder’s usual sources.

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

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

§ 7.2 TIME OF DELIVERY AND FORM OF BONDS

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

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond. Both bonds shall be written in the amount of the Contract Sum.

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

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

ARTICLE 8 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

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

The following supplements modify, change, delete from or add to the Instructions to Bidders, AIA Document A701, 1997 Edition. Where any Article of the Instruction to Bidders is modified or any Paragraph, Subparagraph or Clause thereof is modified or deleted by the Supplementary Instructions to Bidders, the unaltered provisions of that Article, Paragraph, Subparagraph or Clause shall remain in effect.

ARTICLE 3  BIDDING DOCUMENTS
Add to or supplement Article 3, with the following:
3.2.1.1 Where Owner can reasonably establish that a bidder has knowledge or and failed to report a material error, inconsistency, or inaccuracy, Owner may find bidder non-responsive or unresponsible.

ARTICLE 4  BIDDING PROCEDURES
Add to or supplement Article 4, with the following:
4.1.1 A photocopy of the form bound in the Project Manual or a modified form included in an addendum is acceptable.
4.1.7 A corporate seal is not required if not required by the state of incorporation.
4.1.8 Bidder shall be a legal resident of the United States of America and shall only employ legal residents.
4.1.8.1 If the Bidder is a corporation, partnership, sole proprietorship or other legal entity, and employs individual persons, by submitting its bid, the Bidder warrants that it does not knowingly hire or engage any illegal aliens or persons not authorized to work in the United States; it takes steps to verify that it does not hire or engage any illegal aliens or persons not authorized to work in the United States; and that any misrepresentation in this regard or any employment of persons not authorized to work in the United States constitutes a material breach and shall be cause for the imposition of monetary penalties and/or termination of any contract resulting from this bid; or
4.1.8.2 If the Bidder is a natural person eighteen (18) years of age or older,
  a. by submitting its bid, Bidder warrants that its bid is subject to Idaho Code section 67-7903 and, pursuant thereto, by submitting its bid, Bidder attests, under penalty of perjury, that it is a United State citizen or legal permanent resident or that it is otherwise lawfully present in the United State pursuant to federal law; and
  b. prior to being issued a contract, Bidder will be required to submit proof of lawful presence in the United State in accordance with Idaho Code section 67-7903.
4.1.9 Bids submitted must contain all original signatures in ink on all required forms, including the following:
   ▪ Bid Proposal Form
   ▪ Contractor’s Affidavit concerning Alcohol and Drug-Free Workplace
   ▪ Bidders Acknowledgement Statement
   ▪ Bid Bond
4.2.1 Delete the last sentence.
4.2.1.1 To be considered, proposals must be accompanied by an acceptable security in the amount not less than five (5) percent of the total amount of the bid including add alternates. The security may be in the form of a bond or certified or cashier’s check.
4.2.1.2 A successful bidder who fails to sign the contract for the work or furnish the required bonds within 10 days following the receipt of Notice of Intent to Award a Contract, shall forfeit the security. The Owner may then award the contract to the next lowest bidder.
4.2.2 A standard surety bid bond form meeting all the conditions of the AIA Document A310 is
acceptable.

4.2.3.1 The specified time for retainage of the bid security is 45 days after the opening of bids, so long as the bidder has not been notified of the acceptance of the bid.

4.3.1.1 The mailing envelope containing the bid shall be addressed as follows:

Idaho Transportation Department
P.O. Box 83720
Boise, Idaho 83720-0072
Attn: Tony Pirc – Bid Proposal/Carey Maintenance Building Addition

4.3.5 Along with his bid the bidder shall submit an affidavit certifying his compliance with Idaho Code, Title 72, Chapter 17, requiring the contractor and his subcontractors at the time of bid to provide a drug-free workplace program and to maintain such program throughout the duration of the contract.

4.3.6 Along with his bid the bidder shall submit an executed copy of the Bidder’s Acknowledgement Statement provided herein.

ARTICLE 5 CONSIDERATION OF BIDS
Add to Article 5, the following:

5.4 PUBLIC WORKS CONTRACTORS LICENSE
5.4.1 This Public Works project is not financed in whole or in part by Federal Aid Funds. Bid Proposals will be accepted from those contractors only (prime contractors, subcontractor, and/or specialty contractors) who, prior to the bid opening, hold current licenses as public works contractors in the State of Idaho.

5.5 EMPLOYMENT PRACTICES
5.5.1 Bids shall be based on the provisions of Section 44-1001 and 44-1002 of the Idaho Code dealing with labor preference.

5.6 NAMING OF SUBCONTRACTORS
5.6.1 Section 67-2310, Idaho Code, requires general (prime) contractors to include in their bid the name of the subcontractors who shall, in the event the contractor secures the contract, subcontract the plumbing, HVAC, and electrical work under the general prime contract. Failure to name subcontractors, as required, shall render any bid submitted by a general (prime) contractor unresponsive and void. Subcontractors named in accordance with the provisions of this section must possess an appropriate license or certificate of competency issued by the State of Idaho covering the contractor work classification in which the subcontractor is named.

The Idaho Transportation Department requires the bidder to complete Bid Proposal Page 2 in its entirety for all categories of work listed. The Idaho Transportation Department also requires that the general (prime) contractor name the entity that will perform the work, including if the entity is a subcontractor, a sub-subcontractor or the general (prime) contractor submitting the bid. Failure to complete Bid Proposal, Page 2 in full shall render a bid unresponsive and void.

With regard to possessing an appropriate license or certificate of competency all subcontractors listed by the general (prime) contractor must have at the time of the bid opening a current license in the appropriate category (class, type and specialty category) as issued by the Public Works Contractors State License Board. In addition, plumbing, HVAC and electrical subcontractors shall have at the
time of the bid opening a valid plumbing contractor’s license, HVAC contractor’s license or electrical contractor’s license, respectively, as issued by the Idaho Division of Building Safety.

In determining if the above listed subcontractors are required on the project, the Idaho Transportation Department will refer to the plans and specifications. If doubt exists prior to bid closing, potential bidders should contact the Idaho Transportation Department and the architect/engineer who prepare the plans and specifications will be requested to make the determination. If plumbing, HVAC, boiler, or electrical work in not shown on the plans and specifications, but is discovered by the bidder subsequent to the date of bid opening, then the bidder must request clarification form the architect/engineer. Absent such clarification, work will be considered incidental and naming of the subcontractor will not be required.

5.7 IDAHO DOMICILED CONTRACTORS

5.7.1 Section 67-2348, Idaho Code, requires the Idaho Transportation Department to apply a preference in determining which contractor submitted the lowest responsible bid. If the contractor who submitted the lowest dollar bid is domiciled in a state, which has preference law, which penalizes Idaho domiciled contractors then the Idaho Transportation Department must apply preference. The preference that will be applied is the preference 1a of the domiciliary state of the contractor who submitted the lowest dollar bid.

Generally speaking, a contractor’s domiciliary state is the state in which the contractor’s home office is located. If federal fund are involved in the project then no preference will be used.

ARTICLE 6; POST BID INFORMATION

Delete paragraph 6.2

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

Modify and add to Article 7, the following:

In subparagraph 7.2.1, in the first sentence, delete “three days following the date of execution of the Contract”; and substitute “ten days following the receipt of Notice of Intent to Award”.

7.2.2.1 Performance bond and labor and material payment bond are required for this project; each in an amount of not less than 100% of the contract amount, and issued by a surety company authorized to do business in Idaho.

END OF SUPPLEMENTARY INSTRUCTIONS TO BIDDERS
IDAHO TRANSPORTATION DEPARTMENT
CAREY MAINTENANCE BUILDING ADDITION

BID PROPOSAL FORM

TO: Idaho Transportation Department
    P.O. Box 83720
    Boise, Idaho 83720
    Attn: Tony Pirc – Bid Proposal/Carey Maintenance Building Addition

Bidding Contractor:

In compliance with your Invitation for Bid for the construction of (ITD Project No.18402, Carey Maintenance Building Addition), having examined the bidding and contract documents 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, the Bidder hereby proposes to furnish all labor, materials and supplies, and to provide the service and insurance in accordance with the Bidding Requirements and Contract Documents, within the time set forth therein, and at the price(s) stated below. These prices are to cover all expenses incurred in performing the work required under the Contract Documents.

Bidder hereby agrees to commence work under this contract on a date to be specified in a written "Notice to Proceed" by the Construction Manager and to substantially complete the Work within 120 consecutive calendar days thereafter.

SCOPE OF WORK:

The complete work of furnishing and installing Carey Maintenance Building Addition per plans and specifications.

Provide safety barricades/fencing around work area.

GENERAL PROVISIONS:

Bidder shall assign and provide to the site, a designated, full-time, competent supervisor over all of the bidder’s activities; supervisor shall have knowledge of the trade work and be of capacity to make decisions on the behalf of the Bidder.

The successful bidder shall coordinate with the Owner’s staff as the work progresses with respect to any changes in scope of work, material selections, methods, scheduling and quality.

The “Scope of Work” description above is intended to describe the general scope of the work included in this Bid Package. Incidental work related to the general scope outlined above, not specifically described, is deemed to be included. It is the intent the bidder for this work will provide all resources necessary for complete functioning systems and installations.

It is the responsibility of the bidder to review all of the plans and specifications and include all work described in this Bid Package related to this work that is referenced in all bid documents. Bidder should be familiar with the scope of all other bid packages. The Bidder shall ask any questions and bring to the Construction Manager’s attention, any discrepancies in the bid documents prior to submitting this bid proposal.
It is the responsibility of the bidder to clean up and remove refuse related to their work on a daily basis unless specifically noted otherwise or directed otherwise in the field.

OSHA safety regulations will be strictly enforced. All workers on site will adhere to OSHA required PP&E and be easily identifiable with minimum Hi-Vis Class 2 safety vests worn at all times.

Any and all concerns and questions through to bidding phase will be addressed to the Construction Manager. Do not request clarifications from the Architect, Engineer or the Owner. All questions shall be emailed to Roy Jackson at: rjackson@petrainc.net

Bidder warrants that bid has been prepared and that any contract resulting from acceptance of this bid is subject to Subparagraph 4.1.8.1 of the Supplementary Instructions to Bidders.

BASE PROPOSAL:

Bidder understands that the Owner reserves the right to reject any or all bids and to waive any informality in the bidding.

The bidder agrees that this bid shall be good and may not be withdrawn for a period of 45 calendar days after the scheduled closing time for receiving bids.

The bid security attached in the amount of 5% of the bid amount is to become the property of the Owner in the event the contract and bond are not executed within the time set forth, as liquidated damages for the deal and additional expense to the Owner caused thereby.

Upon receipt of written notice of the acceptance of this bid, Bidder will execute the formal contract attached within 10 days and deliver a Surety Bond or Bonds as required by Article 7 of the Instructions to Bidders as modified by the Supplementary Instructions to Bidders.

Pursuant to Section 67-2310, Idaho Code, commonly known as the naming law, the names and addresses of the entities who will perform the plumbing, heating and air conditioning and electrical work, subject to approval of Owner and Architect, if Undersigned is awarded the Contract, are as follows:

Plumbing (PWCLB Category 15400)
(Name) _________________________________________________________
(Address)  _______________________________________________________
Idaho Public Works Contractors License No. ___________________________
Idaho Plumbing Contractors License No. ______________________________

Heating, Ventilating & Air Conditioning (HVAC) (PWCLB Category 15700)
(Name) _________________________________________________________
(Address)  _______________________________________________________
Idaho Public Works Contractors License No. ___________________________
Idaho HVAC Contractors License No. ______________________________

Electrical (PWCLB Category 16000)
(Name) ____________________________
(Address)  _______________________________________________________
Idaho Public Works Contractors License No. ___________________________
Idaho Electrical Contractors License No. ______________________________
ITD District 3 Shop Maintenance Building,
Bid Package # 1 Hazardous Material Abatement & Selective Demolition Page 3 of 3
FAILURE TO NAME A PROPERLY LICENSED CONTRACTOR IN EACH OF THE ABOVE CATEGORIES WILL RENDERTH E BID UNRESPONSIV E AND VOID. If a bidder determines plumbing, heating/air conditioning and/or electrical work is not required to be done by a licensed contractor, bidder should complete the line referencing that work with “Not applicable” and provide an explanation.

Should the listing of subcontractors change due to selection of alternates or other similar circumstances, attach explanation.

Respectfully submitted.

Acknowledge Addenda ______________________________________________________________

Bidder agrees to perform all of the base proposal work described in the specifications and shown on the plans for the sum of:

Base Bid Amount: _________________________________________________________________

($ __________________________ )

Bid Alternate #1 – Additional Slab on Grade:
Bid Amount: _________________________________________________________________

($ __________________________ )

Bid Alternate #2 – Hardware Door Refinish:
Bid Amount: _________________________________________________________________

($ __________________________ )

Bid Alternate #3 – Paint Office:
Bid Amount: _________________________________________________________________

($ __________________________ )

Bid Alternate #4 – Finish Office Flooring:
Bid Amount: _________________________________________________________________

($ __________________________ )

Bid Alternate #5 – Paint Toilet:
Bid Amount: _________________________________________________________________

($ __________________________ )
Bid Alternate #6 – Epoxy Flooring Toilet Room:
Bid Amount: ________________________________

($ ____________________ )

Bid Alternate #7 – New Toilet Fixtures & Fan:
Bid Amount: ________________________________

($ ____________________ )

Bid Alternate #8 – Exterior Paint:
Bid Amount: ________________________________

($ ____________________ )

The undersigned notifies that he/she is, of this date, duly licensed as an Idaho Public Works Contractor and further that he/she possesses Idaho Public Works Contractor’s License No. ________________ , and is domiciled in the State of ________________.

Company Name: ______________________________________________________
Business Address: _____________________________________________________
By: ________________________________ Title: ________________________________
   (Authorized Signature)

Dated this ______ day of ________ , 2018

Phone: ________________ email: ____________________ Fax: ________________
   (Seal - if bid is by a corporation)

Have you remembered to initial and include all pages of this Bid Package, to include your bid security (bid bond or a certified or a cashier’s check), Contractor’s Affidavit Concerning Alcohol and Drug-Free Workplace and a signed copy of the Bidder’s Acknowledgment Statement in with your bid? If these are not included, your bid will be considered non-responsive.

END OF BID PROPOSAL
CONTRACTOR'S AFFIDAVIT
CONCERNING ALCOHOL AND DRUG-FREE WORKPLACE

STATE OF ______________________
COUNTY OF ______________________

Pursuant to the Idaho Code, Section 72-1717, I, the undersigned, being duly sworn, depose and certify that ________________________________ is in compliance with the provisions of Idaho Code section 72-1717; that ________________________________ provides a drug-free workplace program that complies with the provisions of Idaho Code, title 72, chapter 17 and will maintain such program throughout the life of a state construction contract and that ________________________________ shall subcontract work only to subcontractors meeting the requirements of Idaho Code, section 72-1717(1)(a).

Name of Contractor __________________________________________

Address ______________________________________________________

City and State __________________________________________________

By: ________________________________
   (Signature)

Subscribed and sworn to before me this ______________________ day of ______________________, ______.

Commission expires: ____________________________________________

NOTARY PUBLIC, residing at ______________________________________

_________________________________________________________________

FAILURE TO EXECUTE THIS AFFIDAVIT AND SUBMIT IT ALONG WITH YOUR BID SHALL MAKE YOUR BID NON-RESPONSIVE.

CONTRACTOR’S AFFIDAVIT
ON ALCOHOL AND DRUG-FREE WORKPLACE

BOILR-2005 CM revised 02/27/17
Execute and Submit with Bid.

BIDDER’S ACKNOWLEDGEMENT STATEMENT
NOTE: THE INFORMATION CONTAINED HEREIN IS A SUMMARY OF VITAL CONTRACT PROVISIONS AND DOES NOT CHANGE THE CONTRACT DOCUMENTS THAT WILL GOVERN THIS PROJECT.

Idaho Transportation Department Project No. 18-402

By submitting a bid for this project, the undersigned bidder agrees that, if awarded the contract for construction, Contractor will conform to all conditions and requirements of the contract, including but not limited to:

• Contractor agrees to comply with subparagraph 13.1.3 of the Supplementary Conditions pertaining to Sections 44-1001 and 44-1002, Idaho Code requiring the employment of 95% bona fide Idaho residents and providing for a preference in the employment of bona fide Idaho residents and regarding the employment of persons not authorized to work in the United States.

• Contractor will substantially complete the work within the time stated in the contract documents, or as modified by Change Order.

• If the Contractor fails to substantially complete the Project within the time stated in the contract documents, or as modified by Change Order, the Contractor agrees that the Owner may deduct from the contract amount liquidated damages in the amount per calendar day indicated in the Contract Documents times the number of calendar days until the project is Substantially Complete, as defined in the Contract Documents and as determined by the Architect (or Engineer).

• The Contractor agrees that the amount allowed for overhead and profit on any Change Order is limited to the amounts indicated in paragraph 7.3.10 of the General Conditions of the Contract for Construction, as supplemented, which are stated below.

1. for total changes of $10,000 or less in direct cost, the amount allowed for overhead, profit, bonds and insurance for the Contractor and all subcontractors of any tier combined shall not exceed twenty percent (20%) of direct costs.

2. for total changes exceeding $10,000 in direct cost, the amount allowed for overhead, profit, bonds and insurance for the Contractor and all subcontractors of any tier combined shall not exceed fifteen percent (15%) of direct costs.

3. the Contractor will determine the amount of overhead and profit to be apportioned between the Contractor and its subcontractor of allowable amounts of overhead, profit, bonds and insurance.

• The Contractor agrees that Change Orders are governed by the General Conditions of the Contract for Construction, as supplemented, including but not limited to Section 7.2.3 and Section 7.2.4 of the Supplementary Conditions:
By the execution of a Change Order, the Contractor agrees and acknowledges that he has had sufficient time and opportunity to examine the change in work which is the subject of the Change Order and that he has undertaken all reasonable efforts to discover and disclose any concealed or unknown conditions which may to any extent affect the Contractor's ability to perform in accordance with the Change Order. Aside from those matters specifically set forth in the Change Order, the Owner shall not be obligated to make any adjustments to either the Contract Sum or Contract Time by reason of any conditions affecting the change in work addressed by the Change Order that could have reasonably been discovered or disclosed by the Contractor's examination.

Any Change Order fully executed by the Owner, Contractor and Architect (or Engineer), including but not limited to a Change Order arising by reason of the parties' mutual agreement or by mediation, shall constitute a final and full settlement of all matters relating to or affected by the change in the Work, including but not limited to, all direct and consequential costs associated with such change and any and all adjustments to the Contract Sum and Contract Time. In the event a Change Order increases the Contract Sum, the Contractor shall include the work covered by such Change Order in the Application for Payment as if such work were originally part of the Project and Contract Documents.

**FAILURE TO EXECUTE THIS ACKNOWLEDGEMENT WILL MAKE THE BID NONRESPONSIVE.**

I, __________________________________________________________________________, being duly authorized to bind the bidder
(type or print name of individual)
______________________________________________________________________________, does hereby certify that
(type or print name of company)
______________________________________________________________________________, has fully read and
(type or print name of company)
understands this document and that it highlights certain parts of the contract that will be entered between the parties and that will govern this Project.

Signed: ____________________________________________________________________
Title: __________________________
Date: ______________

**END OF BIDDER’S ACKNOWLEDGEMENT STATEMENT**
REQUEST FOR TAX RELEASE

Date: _________________

RE: ITD Project Number: 18-402
  Project Name: Carey Maintenance Building Addition
  Agency: Idaho Transportation Department

Contractor Requesting Release – Name: _______________________________
  Address: _______________________________
  Contact Name: _______________________________
  Telephone Number: _______________________________
  Federal Employer Identification No.: _______________________________

Project Information:
  Project is Complete: _______________________________
  Project is Substantially Complete: _______________________________
  Project Start Date: _______________________________
  Project Complete Date: _______________________________
  Final Contract Amount (including change orders): _______________________________

Did any public works or other governmental agency supply materials, which were installed by this contractor or his subcontractors? Yes ________
  No ________

If yes, list these materials and their dollar values: _______________________________

________________________________________
________________________________________
To request a Tax Release, please send this form to:

Attn: Contract Desk; Sales Tax Audit; Idaho State Tax Commission;
PO Box 36; Boise, ID 83722
SECTION 005000 - CONTRACTING FORMS AND SUPPLEMENTS

PART 1 GENERAL

1.01 CONTRACTOR IS RESPONSIBLE FOR OBTAINING A VALID LICENSE TO USE ALL COPYRIGHTED DOCUMENTS SPECIFIED BUT NOT INCLUDED IN THE PROJECT MANUAL.

1.02 AGREEMENT AND CONDITIONS OF THE CONTRACT

A. See Section 007200 - General Conditions for the General Conditions.
B. See Section 007300 - Supplementary Conditions for the Supplementary Conditions.
C. The Agreement is based on AIA A132/CMa.
D. The General Conditions are based on AIA A232/CMa.

1.03 FORMS

A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in the Contract Documents.
B. Bond Forms:
   1. Bid Bond Form: AIA A310.
   2. Performance and Payment Bond Form: AIA A312.
C. Post-Award Certificates and Other Forms:
      a. Supplemental Attachment: AIA G715
   2. Application for Payment Forms: AIA G732, AIA G736 and AIA G737 (for Construction Manager as Adviser to compile and summarize contractor’s application and certificate for payment).
D. Clarification and Modification Forms:
   2. Change Order Form (for Construction Manager as Adviser): AIA G701CMa.
E. Closeout Forms:

1.04 REFERENCE STANDARDS

A. AIA A132 - Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition; 2009.
C. AIA A310 - Bid Bond; 2010.
D. AIA A312 - Performance Bond and Payment Bond; 2010.
J. AIA G736 - Project Application and Project Certificate for Payment, Construction Manager as Adviser Edition; 2009.
K. AIA G737 - Summary of Contractors’ Applications for Payment, Construction Manager as Adviser Edition; 2009.
PART 2  PRODUCTS - NOT USED
PART 3  EXECUTION - NOT USED

END OF SECTION 005000
SECTION 005200 - AGREEMENT FORM

PART 1 GENERAL

1.01 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR
   A. AIA Document A132/CMa, 2009 Edition, Standard Form of Agreement Between Owner and Contractor – Construction Manager-Advisor Edition will be used as the agreement for this project. Copies of AIA Document A132/CMa are available for review at the offices of the Owner, Architect, and Construction Manager. Copies of the document may be purchased from the American Institute of Architects or its local distributors.

1.02 RELATED REQUIREMENTS
   A. Section 007200 - General Conditions.
   B. Section 007300 - Supplementary Conditions.
   C. Section 014218 - Definitions.

1.03 MODIFICATIONS TO THE AGREEMENT FORM
   A. ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
      1. 3.1 The date of commencement will be fixed by issuance of a "Notice of Intent to Award" and a "Notice to Proceed". Delete the last sentence of paragraph 3.1.
      2. 3.2 Liquidated damages will be included as provided in the Supplementary Conditions.
   B. ARTICLE 5 PAYMENTS
      1. In paragraph 5.2, delete "as follows:" and replace with "a day agreed upon by the Owner and Contractor."
      2. Delete paragraph 5.3 and substitute the following:
      3. 5.3 Provided that an application for payment is received by the Construction Manager on the established date, the Owner shall make payment to the Contractor not later than 21 days from receipt by the Owner of the certification by the Construction Manager.
      4. In subparagraphs 5.6.1 and 5.6.2 Retainage will be five percent (5%) for work completed and material suitably stored.
      5. In subparagraph 5.6.1, delete the last sentence. Delete subparagraphs 5.7.1, 5.7.2 and paragraph 5.8.
      6. No reduction in retainage will be allowed prior to final completion without written approval of the Owner. Refer to Supplementary Condition 9.6.1.1.
      7. Add new paragraph 5.9:
      8. 5.9 A condition will be included forbidding more retainage from a subcontractor or supplier than retained from their portion of the work.
   C. ARTICLE 7 MISCELLANEOUS PROVISIONS
      1. 7.2 Will be modified to agree with paragraph 13.6.1 of the Supplementary Conditions.
      2. 7.4.1 Contractor warrants that it does not knowingly hire or engage any illegal aliens or persons not authorized to work in the United States; it takes steps to verify that it does not hire or engage any illegal aliens or persons not authorized to work in the United States; and that any misrepresentation in this regard or any employment of persons not authorized to work in the United States constitutes a material breach and shall be cause for the imposition of monetary penalties not to exceed five percent (5%) of the total Contract Amount per violation and/or termination of this contract.
   D. ARTICLE 8 TERMINATION OR SUSPENSION
      1. Add to both paragraphs 8.1 and 8.2 "as modified by the Supplementary Conditions."

PART 2 PRODUCTS (NOT USED)
PART 3 EXECUTION (NOT USED)

END OF SECTION 005200
STATE OF IDAHO

COUNTY OF ADA

Pursuant to the Idaho Code, Title 63, Chapter 15, I, the undersigned, being duly sworn, depose and certify that all taxes, excises and license fees due to the State or its taxing units, for which I or my property is liable then due or delinquent, has been paid, or arrangements have been made, before entering into a contract for construction of any public works in the State of Idaho.

Name of Contractor

Address

City and State

By: ____________________________ (Signature)

Subscribed and sworn to before me this ___________ day of __________, 20__.

Commission expires: ____________________________

NOTARY PUBLIC, residing at

______________________________
General Conditions of the Contract for Construction, Construction Manager as Adviser Edition

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

Idaho Transportation Department
Carey Maintenance Building Addition
US 95, MP 205
Carey, Idaho

THE CONSTRUCTION MANAGER:
(Name, legal status and address)

Petra, Incorporated
1097 N. Rosario Street, Suite 200
Meridian, Idaho 83642

THE OWNER:
(Name, legal status and address)

State of Idaho Transportation Department
3311 West State Street
Boise, Idaho 83707

THE ARCHITECT:
(Name, legal status and address)

Hutchison Smith Architects
270 N. 27th Street, Suite A
Boise, Idaho 83702

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

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

This document is intended to be used in conjunction with AIA Documents A132™–2009, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition; B132™–2009, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132™–2009, Standard Form of Agreement Between Owner and Construction Manager as Adviser.

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ARTICLE 1  GENERAL PROVISIONS

§ 1.1 Basic Definitions

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

§ 1.1.2 The Contract. The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect’s consultants, (2) between the Owner and the Construction Manager or the Construction Manager’s consultants, (3) between the Owner and the Architect or the Architect’s consultants, (4) between the Contractor and the Construction Manager or the Construction Manager’s consultants, (5) between the Owner and a Subcontractor or Sub-subcontractor (6) between the Construction Manager and the Architect, or (7) between any persons or entities other than the Owner and Contractor. The Construction Manager and Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of their 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 other Multiple Prime Contractors and by the Owner’s own forces, including persons or entities under separate contracts not administered by the Construction Manager.

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

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

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

§ 1.1.8 Initial Decision Maker. The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.
§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

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

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

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

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

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

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

ARTICLE 2 OWNER
§ 2.1 General
§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner’s approval or authorization. Except as otherwise provided in Article 4, the Construction Manager and the Architect do not have such authority. The term "Owner" means the Owner or the Owner’s authorized representative.

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

§ 2.2 Information and Services Required of the Owner
§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner’s obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner’s ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the
portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not
materially vary such financial arrangements without prior notice to the Contractor.

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

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

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

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

§ 2.2.6 The Owner shall endeavor to forward all communications to the Contractor through the Construction Manager
and shall contemporaneously provide the same communications to the Architect about matters arising out of or
relating to the Contract Documents.

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

§ 2.4 Owner’s Right to Carry Out the Work
If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails
within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such
default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may
have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments
then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner’s expenses
and compensation for the Construction Manager’s and Architect’s and their respective consultants’ additional services
made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor
are both subject to prior approval of the Architect, after consultation with the Construction Manager. If payments then
or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the
Owner.

ARTICLE 3 CONTRACTOR
§ 3.1 General
§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the
Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction
where the Project is located. The Contractor shall designate in writing a representative who shall have express
authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the
Contractor or the Contractor’s authorized representative.

§ 3.1.2 The plural term "Multiple Prime Contractors" refers to persons or entities who perform construction under
contracts with the Owner that are administered by the Construction Manager. The term does not include the Owner’s
own forces, including persons or entities under separate contracts not administered by the Construction Manager.

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User Notes:
§ 3.1.3 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.4 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Construction Manager or Architect in their 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 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Construction Manager and Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information submitted to the Construction Manager in such form as the Construction Manager and 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 Construction Manager and Architect any nonconformity discovered by or made known to the Contractor as a request for information submitted to Construction Manager in such form as the Construction Manager and Architect may require.

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

§ 3.3 Supervision and Construction Procedures
§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor’s best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instruction concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner, the Construction Manager, and the Architect and shall not proceed with that portion of the Work without further written instructions from the Architect, through the Construction Manager. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.
§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons 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 the Project already performed to determine that such portions are in proper condition to receive subsequent Work.

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

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

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

§ 3.5 Warranty
The Contractor warrants to the Owner, Construction Manager, 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 with 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 Construction Manager or Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 Taxes
The Contractor shall pay sales, consumer, use and similar taxes for the Work or portions thereof 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 Owner, through the Construction Manager, shall secure and pay for the building permit. The Contractor shall secure and pay 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, Construction Manager, and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect and Construction

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Manager will promptly investigate such conditions and, if the Architect, in consultation with the Construction Manager, determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect, in consultation with the Construction Manager, 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, Construction Manager, and Contractor in writing, stating the reasons. If the Owner or Contractor disputes the Architect's determination or recommendation, either party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner, Construction Manager, 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;
.3 Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

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

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

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner and Architect through the Construction Manager, the name and qualifications of a proposed superintendent. The Construction Manager may reply within 14 days to the Contractor in writing stating (1) whether the Owner, the Construction Manager, or the Architect has reasonable objection to the proposed superintendent or (2) that any of them require additional time to review. Failure of the Construction Manager to reply within the 14 day period shall constitute notice of no reasonable objection.

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

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

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The Contractor shall cooperate with the Construction Manager in scheduling and performing the Contractor’s Work to avoid conflict with, and as to cause no delay in, the work or activities of other Multiple Prime Contractors or the construction or operations of the Owner’s own forces.

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

§ 3.10.3 The Contractor shall participate with other Contractors, the Construction Manager and Owner in reviewing and coordinating all schedules for incorporation into the Project schedule that is prepared by the Construction Manager. The Contractor shall make revisions to the construction schedule and submittal schedule as deemed necessary by the Construction Manager to conform to the Project schedule.

§ 3.10.4 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner, Construction Manager and Architect and incorporated into the approved Project schedule.

§ 3.11 Documents and Samples at the Site
The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These documents shall be available to the Architect and delivered to the Construction Manager for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

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

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

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

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect and Construction Manager is subject to the limitations of Sections 4.2.9 through 4.2.11. Informational submittals upon which the Construction Manager and Architect are 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 Construction Manager or Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Construction Manager Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the Project submittal schedule approved by the Construction Manager and Architect, or in the absence of an approved Project submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of other Multiple Prime Contractors or the Owner’s own forces. The Contractor shall cooperate with the Construction Manager in the coordination of the Contractor’s Shop Drawings, Product Data, Samples and similar submittals with related documents submitted by other Multiple Prime Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner, Construction Manager, 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

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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 reviewed and approved by the Architect.

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

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

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor’s responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional’s written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

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

§ 3.13.2 The Contractor shall coordinate the Contractor’s operations with, and secure the approval of, the Construction Manager before using any portion of the site.

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

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner’s own forces or of other Multiple Prime Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner’s own forces or by other Multiple Prime Contractors except with written consent of the Construction Manager.
Owner and such other Multiple Prime Contractors; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the other Multiple Prime Contractors or the Owner the Contractor’s consent to cutting or otherwise altering the Work.

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

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner, or Construction Manager with the Owner’s approval, 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, Construction Manager and Architect access to the Work in preparation and progress wherever located.

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

§ 3.18 Indemnification
§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Construction Manager, Architect, Construction Manager’s and 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 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 AND CONSTRUCTION MANAGER
§ 4.1 General
§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referenced throughout the Contract Documents as if singular in number.

§ 4.1.2 The Owner shall retain a construction manager lawfully licensed to practice construction management or an entity lawfully practicing construction management in the jurisdiction where the Project is located. That person or entity is identified as the Construction Manager in the Agreement and is referred to throughout the Contract Documents as if singular in number.
§ 4.1.3 Duties, responsibilities and limitations of authority of the Construction Manager and Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Construction Manager, Architect and Contractor. Consent shall not be unreasonably withheld.

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

§ 4.2 Administration of the Contract

§ 4.2.1 The Construction Manager and Architect will provide administration of the Contract as described in the Contract Documents and will be the Owner’s representatives during construction until the date the Architect issues the final Certificate for Payment. The Construction Manager and 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. On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner and Construction Manager (1) known deviations from the Contract Documents and from the most recent Project schedule prepared by the Construction Manager, and (2) defects and deficiencies observed in the Work.

§ 4.2.3 The Construction Manager shall provide a staffing plan to include one or more representatives who shall be in attendance at the Project site whenever the Work is being performed. The Construction Manager will determine in general if the Work observed is being performed in accordance with the Contract Documents, will keep the Owner reasonably informed of the progress of the Work, and will report to the Owner and Architect (1) known deviations from the Contract Documents and the most recent Project schedule, and (2) defects and deficiencies observed in the Work.

§ 4.2.4 The Construction Manager shall schedule and coordinate the activities of the Contractor and other Multiple Prime Contractors in accordance with the latest approved Project schedule.

§ 4.2.5 The Construction Manager, except to the extent required by Section 4.2.4, and Architect will not have control over, or charge of, construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor’s rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1, and neither will be responsible for the Contractor’s failure to perform the Work in accordance with the requirements of the Contract Documents. Neither the Construction Manager nor the Architect will have control over or charge of or be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or of any other persons or entities performing portions of the Work.

§ 4.2.6 Communications Facilitating Contract Administration. Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Construction Manager, and shall contemporaneously provide the same communications to the Architect about matters arising out of or relating to the Contract Documents. Communications by and with the Architect’s consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with other Multiple Prime Contractors shall be through the Construction Manager and shall be contemporaneously provided to the Architect if those communications are about matters arising out of or related to the Contract Documents. Communications by and with the Owner’s own forces shall be through the Owner.

§ 4.2.7 The Construction Manager and Architect will review and certify all Applications for Payment by the Contractor, in accordance with the provisions of Article 9.

§ 4.2.8 The Architect and Construction Manager have authority to reject Work that does not conform to the Contract Documents and will notify each other about the rejection. The Construction Manager shall determine in general
whether the Work of the Contractor is being performed in accordance with the requirements of the Contract Documents and notify the Owner, Contractor and Architect of defects and deficiencies in the Work. Whenever the Construction Manager considers it necessary or advisable, the Construction Manager will have authority to require additional inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, upon written authorization of the Owner, whether or not such Work is fabricated, installed or completed. The foregoing authority of the Construction Manager will be subject to the provisions of Sections 4.2.18 through 4.2.20 inclusive, with respect to interpretations and decisions of the Architect. However, neither the Architect’s nor the Construction Manager’s authority to act under this Section 4.2.8 nor a decision made by either of them in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect or the Construction Manager to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons performing any of the Work.

§ 4.2.9 The Construction Manager will receive and promptly review for conformance with the submittal requirements of the Contract Documents, all submittals from the Contractor such as Shop Drawings, Product Data and Samples. Where there are Multiple Prime Contractors, the Construction Manager will also check and coordinate the information contained within each submittal received from Contractor and other Multiple Prime Contractors, and transmit to the Architect those recommended for approval. By submitting Shop Drawings, Product Data, Samples and similar submittals, the Construction Manager represents to the Owner and Architect that the Construction Manager has reviewed and recommended them for approval. The Construction Manager’s actions will be taken in accordance with the Project submittal schedule approved by the Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness while allowing sufficient time to permit adequate review by the Architect.

§ 4.2.10 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. Upon the Architect’s completed review, the Architect shall transmit its submittal review to the Construction Manager.

§ 4.2.11 Review of the Contractor’s submittals by the Construction Manager and Architect 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 Construction Manager and 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 Construction Manager and Architect’s review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Construction Manager and Architect, of any construction means, methods, techniques, sequences or procedures. The Architect’s approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.12 The Construction Manager will prepare Change Orders and Construction Change Directives.

§ 4.2.13 The Construction Manager and the Architect will take appropriate action on Change Orders or Construction Change Directives in accordance with Article 7. and the Architect will have authority to order minor changes in the Work as provided in Section 7.4. The Architect, in consultation with the Construction Manager, will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.14 Utilizing the documents provided by the Contractor, the Construction Manager will maintain at the site for the Owner one copy of all Contract Documents, approved Shop Drawings, Product Data, Samples and similar required submittals, in good order and marked clearly to record all changes and selections made during construction. These will be available to the Architect and the Contractor, and will be delivered to the Owner upon completion of the Project.

§ 4.2.15 The Construction Manager will assist the Architect in conducting inspections to determine the dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion in conjunction with the Architect pursuant to Section 9.8; and receive and forward to the Owner written warranties and related
documents required by the Contract and assembled by the Contractor pursuant to Section 9.10. The Construction Manager will forward to the Architect a final Application and Certificate for Payment or final Project Application and Project Certificate for Payment upon the Contractor’s compliance with the requirements of the Contract Documents.

§ 4.2.16 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect’s responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

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

§ 4.2.18 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 so rendered in good faith.

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

§ 4.2.20 The Construction Manager will receive and review requests for information from the Contractor, and forward each request for information to the Architect, with the Construction Manager’s recommendation. The Architect will review and respond in writing to the Construction Manager to requests for information about the Contract Documents. The Construction Manager’s recommendation and the Architect’s response to each request 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 other Multiple Prime Contractors or subcontractors of other Multiple Prime Contractors.

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

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

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

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner, Construction Manager 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, Construction Manager or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner, Construction Manager or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change.
and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor’s Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

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

§ 5.3 Subcontractual Relations
By appropriate agreement written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including responsibility for safety of the Subcontractor’s Work, which the Contractor, by these Documents, assumes toward the Owner, Construction Manager and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner, Construction Manager 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 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

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

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY OTHER CONTRACTORS
§ 6.1 Owner’s Right to Perform Construction with Own Forces and to Award Other Contracts
§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner’s own forces, which include persons or entities under separate contracts not administered by the Construction Manager, and to award other contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When the Owner performs construction or operations with the Owner’s own forces including persons or entities under separate contracts not administered by the Construction Manager, the Owner shall provide for coordination of such forces with the Work of the Contractor, who shall cooperate with them.
§ 6.1.3 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner’s own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11 and 12.

§ 6.2 Mutual Responsibility
§ 6.2.1 The Contractor shall afford the Owner’s own forces, Construction Manager and other Multiple Prime 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’s own forces or other Multiple Prime Contractors, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Construction Manager and Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner’s own forces or other Multiple Prime Contractors’ completed or partially completed construction is fit and proper to receive the Contractor’s Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs, including costs that are payable to a separate contractor or to other Multiple Prime Contractors 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 delays, improperly timed activities, damage to the Work or defective construction by the Owner’s own forces or other Multiple Prime Contractors.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner, separate contractors, or other Multiple Prime Contractors as provided in Section 10.2.3.

§ 6.2.5 The Owner and other Multiple Prime Contractors 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, other Multiple Prime 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 Construction Manager, with notice to 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, Construction Manager, Architect and Contractor; a Construction Change Directive requires agreement by the Owner, Construction Manager and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

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

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

.1 The change in the Work;
§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Construction Manager and signed by the Owner, Construction Manager 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 7.3.7.

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

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

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

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Construction Manager shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Construction Manager may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

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

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Construction Manager and 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 Construction Manager and Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Construction Manager and Architect determine to be reasonably justified. The 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 Construction Manager and 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 Construction Manager shall prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

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

ARTICLE 8 TIME
§ 8.1 Definitions
§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

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

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

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

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

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

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

§ 8.3 Delays and Extensions of Time
§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner, Owner’s own forces, Construction Manager, Architect, any of the other Multiple Prime Contractors or an employee of any of them, or by changes ordered in the Work, or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor’s control; or by delay authorized by the Owner pending mediation and arbitration, or by other causes that the Architect, based on the recommendation of the Construction Manager, determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

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

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

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ARTICLE 9 PAYMENTS AND COMPLETION

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

§ 9.2 Schedule of Values
Where the Contract is based on a Stipulated Sum or Guaranteed Maximum Price, the Contractor shall submit to the Construction Manager, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Construction Manager and Architect may require. This schedule, unless objected to by the Construction Manager or Architect, shall be used as a basis for reviewing the Contractor’s Applications for Payment. In the event there is one Contractor, the Construction Manager shall forward to the Architect the Contractor’s schedule of values. If there are Multiple Prime Contractors responsible for performing different portions of the Project, the Construction Manager shall forward the Multiple Prime Contractors’ schedules of values only if requested by the Architect.

§ 9.3 Applications for Payment
§ 9.3.1 At least fifteen days before the date established for each progress payment, the Contractor shall submit to the Construction Manager an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor’s right to payment as the Owner, Construction Manager or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 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 Construction Manager and Architect, but not yet included in Change Orders.

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

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

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

§ 9.4 Certificates for Payment
§ 9.4.1 Where there is only one Contractor, the Construction Manager will, within seven days after the Construction Manager’s receipt of the Contractor’s Application for Payment, review the Application, certify the amount the Construction Manager determines is due the Contractor, and forward the Contractor’s Application and Certificate for Payment to the Architect. Within seven days after the Architect receives the Contractor’s Application for Payment from the Construction Manager, the Architect will either issue to the Owner a Certificate for Payment, with a copy to the Construction Manager, for such amount as the Architect determines is properly due, or notify the Construction Manager and Owner in writing of the Architect’s reasons for withholding certification in whole or in part as provided
in Section 9.5.1. The Construction Manager will promptly forward to the Contractor the Architect’s notice of withholding certification.

§ 9.4.2 Where there are Multiple Prime Contractors performing portions of the Project, the Construction Manager will, within seven days after the Construction Manager receives the Multiple Prime Contractors’ Applications for Payment: (1) review the Applications and certify the amount the Construction Manager determines is due each of the Multiple Prime Contractors; (2) prepare a Summary of Contractors’ Applications for Payment by combining information from each Multiple Prime Contractors’ application with information from similar applications for progress payments from other Multiple Prime Contractors; (3) prepare a Project Application and Certificate for Payment; (4) certify the amount the Construction Manager determines is due all Multiple Prime Contractors; and (5) forward the Summary of Contractors’ Applications for Payment and Project Application and Certificate for Payment to the Architect.

§ 9.4.3 Within seven days after the Architect receives the Project Application and Project Certificate for Payment and the Summary of Contractors’ Applications for Payment from the Construction Manager, the Architect will either issue to the Owner a Project Certificate for Payment, with a copy to the Construction Manager, for such amount as the Architect determines is properly due, or notify the Construction Manager and Owner in writing of the Architect’s reasons for withholding certification in whole or in part as provided in Section 9.5.1. The Construction Manager will promptly forward the Architect’s notice of withholding certification to the Contractors.

§ 9.4.4 The Construction Manager’s certification of an Application for Payment or, in the case of Multiple Prime Contractors, a Project Application and Certificate for Payment shall be based upon the Construction Manager’s evaluation of the Work and the information provided as part of the Application for Payment. The Construction Manager’s certification will constitute a representation that, to the best of the Construction Manager’s knowledge, information and belief, the Work has progressed to the point indicated and the quality of the Work is in accordance with the Contract Documents. The certification will also constitute a recommendation to the Architect and Owner that the Contractor be paid the amount certified.

§ 9.4.5 The Architect’s issuance of a Certificate for Payment or in the case of Multiple Prime Contractors, Project Application and Certificate for Payment, shall be based upon the Architect’s evaluation of the Work, the recommendation of the Construction Manager, and information provided as part of the Application for Payment or Project Application for Payment. The Architect’s certification will constitute a representation that, to the best of the Architect’s knowledge, information and belief, the Work has progressed to the point indicated, that the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified.

§ 9.4.6 The representations made pursuant to Sections 9.4.4 and 9.4.5 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 Construction Manager or Architect.

§ 9.4.7 The issuance of a separate Certificate for Payment or a Project Certificate for Payment will not be a representation that the Construction Manager or Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed the Contractor’s construction methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor’s right to payment or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Construction Manager or Architect may withhold a Certificate for Payment or Project Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Construction Manager’s or Architect’s opinion the representations to the Owner required by Section 9.4.4 and 9.4.5 cannot be made. If the Construction Manager or Architect is unable to certify payment in the amount of the Application, the Construction Manager will notify the Contractor and Owner as provided in Section 9.4.1 and 9.4.3. If the Contractor, Construction Manager and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment or a Project Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Construction Manager or Architect may also withhold a Certificate for Payment or, because of
subsequently discovered evidence or subsequent observations, may nullify the whole or a part of a Certificate for Payment or Project Certificate for Payment previously issued, to such extent as may be necessary in the Construction Manager’s or Architect’s opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from the acts and omissions described in Section 3.3.2 because of

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

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

§ 9.5.3 If the Architect or Construction Manager withholds certification for payment under Section 9.5.1, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Construction Manager and both will reflect such payment on the next Certificate for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment or Project 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 Construction Manager and 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 Construction Manager 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 Owner, Construction Manager and Architect on account of portions of the Work done by such Subcontractor.

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

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

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

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

§ 9.7 Failure of Payment
If the Construction Manager and Architect do not issue a Certificate for Payment or a Project Certificate for Payment, through no fault of the Contractor, within fourteen days after the Construction Manager’s 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 Construction Manager and Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days’ written notice to the Owner, Construction Manager and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor’s reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion
§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so 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 notify the Construction Manager, and the Contractor and Construction Manager shall jointly 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 list, the Architect, assisted by the Construction Manager, 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 list, which is not sufficiently complete in accordance with the requirements of 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, assisted by the Construction Manager, to determine Substantial Completion.

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

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

§ 9.9 Partial Occupancy or Use
§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor and Construction Manager shall jointly prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Owner 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 after consultation with the Construction Manager.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Construction Manager, 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 completion of the Work, the Contractor shall forward to the Construction Manager a written notice that the Work is ready for final inspection and acceptance and shall also forward to the Construction Manager a final Contractor’s Application for Payment. Upon receipt, the Construction Manager will evaluate the completion of Work of the Contractor and then forward the notice and Application, with the Construction Manager’s recommendations, to the Architect who will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Construction Manager and Architect will promptly issue a final Certificate for Payment or Project Certificate for Payment stating that to the best of their knowledge, information and belief, and on the basis of their on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Construction Manager’s and Architect’s final Certificate for Payment or Project 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 through the Construction Manager (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner’s property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days’ prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys’ fees.

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

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

.1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
.2 failure of the Work to comply with the requirements of the Contract Documents; or
.3 terms of special warranties required by the Contract Documents.
§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY
§ 10.1 Safety Precautions and Programs
The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall submit the Contractor’s safety program to the Construction Manager for review and coordination with the safety programs of other Contractors. The Construction Manager’s responsibilities for review and coordination of safety programs shall not extend to direct control over or charge of the acts or omissions of the Contractors, Subcontractors, agents or employees of the Contractors or Subcontractors, or any other persons performing portions of the Work and not directly employed by the Construction Manager.

§ 10.2 Safety of Persons and Property
§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to
1. employees on the Work and other persons who may be affected thereby;
2. the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor’s Subcontractors or Sub-subcontractors;
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; and
4. construction or operations by the Owner or other Contractors.

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

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

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

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2, 10.2.1.3 and 10.2.1.4 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, 10.2.1.3 and 10.2.1.4, except damage or loss attributable to acts or omissions of the Owner, Construction Manager or Architect or anyone directly or indirectly employed by any of them, or by anyone for whose acts any 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, Construction Manager and Architect.

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

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

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

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

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

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

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

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

§ 10.4 Emergencies
In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.
ARTICLE 11  INSURANCE AND BONDS
§ 11.1 Contractor's Liability Insurance
§ 11.1.1 The Contractor shall purchase and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor’s operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

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

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment and, with respect to the Contractor’s completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

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

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Construction Manager, the Construction Manager’s consultants, the Owner, the Architect, and the Architect’s consultants as additional insureds for claims caused in whole or in part by the Contractor’s negligent acts or omissions during the Contractor’s operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor’s negligent acts or omissions during the Contractor’s completed operations.

§ 11.2 Owner’s Liability Insurance
The Owner shall be responsible for purchasing and maintaining the Owner’s usual liability insurance.

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

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

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

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

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

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

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

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

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

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, adjoining or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

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

§ 11.3.7 Waivers of Subrogation. The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees each of the other, and (2) the Construction Manager, Architect, Architect’s consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as the Owner and Contractor may have to the proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Construction Manager, Construction Manager’s consultants, Architect, Architect’s consultants, Owner’s separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insured’s, as their interests may appear, subject to requirements of any applicable mortgage clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

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

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

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

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK
§ 12.1 Uncovering of Work
§ 12.1.1 If a portion of the Work is covered contrary to the Construction Manager’s or Architect’s request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by either, be uncovered for their observation 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 which the Construction Manager or Architect has not specifically requested to observe prior to its being covered, the Construction Manager or Architect may request to see such Werk
and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner’s expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor’s expense unless the condition was caused by the Owner or one of the other Contractors in which event the Owner shall be responsible for payment of such costs.

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

§ 12.2.2 After Substantial Completion
§ 12.2.2.1 In addition to the Contractor’s obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof, or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

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

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

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

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

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

§ 12.3 Acceptance of Nonconforming Work
If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.
ARTICLE 13  MISCELLANEOUS PROVISIONS  
§ 13.1 Governing Law  
The Contract shall be governed by the law of the place where the Project is located except that, if the parties have  
selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.  

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

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

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

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

§ 13.4.2 No action or failure to act by the Owner, Construction Manager, 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  
or acquiescence in a breach thereunder, except as may be specifically agreed in writing.  

§ 13.5 Tests and Inspections  
§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents  
and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless  
otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an  
independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall  
bear all related costs of tests, inspections and approvals. The Contractor shall give the Construction Manager and  
Architect timely notice of when and where tests and inspections are to be made so that the Construction Manager and  
Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do  
not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals  
where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.  

§ 13.5.2 If the Construction Manager, Architect, Owner or public authorities having jurisdiction determine that  
portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the  
Construction Manager and 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 Construction Manager and Architect of when and where tests and inspections  
are to be made so that the Construction Manager and Architect may be present for such procedures. Such costs except  
as provided in Section 13.5.3, shall be at the Owner's expense.  

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the  
portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by  
such failure including those of repeated procedures and compensation for the Construction Manager's and Architect's  
services and expenses shall be at the Contractor’s expense.  

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract  
Documents, be secured by the Contractor and promptly delivered to the Construction Manager for transmission to the  
Architect.
§ 13.5.5 If the Construction Manager or Architect is to observe tests, inspections or approvals required by the Contract Documents, the Construction Manager or Architect will do so promptly and, where practicable, at the normal place of testing.

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

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

§ 13.7 Time Limits on Claims
The Owner and the Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and the Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor
§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:
.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;
.3 Because the Construction Manager has not certified or 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, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
.4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor’s request, reasonable evidence as required by Section 2.2.1.

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

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days’ written notice to the Owner, Construction Manager and Architect, terminate the Contract and recover from the Owner payment for Work executed including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner’s obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days’ written notice to the Owner, Construction Manager and 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;
fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, after consultation with the Construction Manager, and upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor’s surety, if any, seven days’ written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:
\[1]\] Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
\[2]\] Accept assignment of subcontracts pursuant to Section 5.4; and
\[3]\] Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

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

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Construction Manager’s and 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, upon application, be certified by the Initial Decision Maker after consultation with the Construction Manager, 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 the Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent:
\[1]\] that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
\[2]\] that an equitable adjustment is made or denied under another provision of this Contract.

§ 14.4 Termination by the Owner for Convenience
§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner’s convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner’s convenience, the Contractor shall
\[1]\] cease operations as directed by the Owner in the notice;
\[2]\] take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
\[3]\] except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner’s convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.
ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition. A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 Notice of Claims. Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Construction Manager and Architect, if the Construction Manager and or Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 Continuing Contract Performance. Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Construction Manager will prepare Change Orders and the Architect will issue a Certificate for Payment or Project Certificate for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 Claims for Additional Cost. If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.3.

§ 15.1.5 Claims for Additional Time

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

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

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

1. damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

2. damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date of final payment on the date of final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

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

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

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of a 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 and Construction Manager, if the Architect or Construction Manager is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

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

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

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

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

§ 15.3 Mediation
§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

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

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

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

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

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

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

§ 15.4.4 Consolidation or Joinder
§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

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

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.
STRUCTURAL CALCULATIONS
FOR
ITD Maintenance Building Addition
Carey, Idaho

For
HSA Architects
Boise, Idaho

AHJ ENGINEERS, PC
STRUCTURAL CONSULTANTS
5418 N. Eagle Rd. #140
Boise, Idaho 83713
208.323.0199

Project#18034
ITD CAREY MAINTENANCE BUILDING ADDITION

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<table>
<thead>
<tr>
<th>Design Criteria</th>
<th>1</th>
<th>thru</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof Framing Design</td>
<td>9</td>
<td>thru</td>
<td>24</td>
</tr>
<tr>
<td>Floor Framing Design</td>
<td>25</td>
<td>thru</td>
<td>31</td>
</tr>
<tr>
<td>Column Design</td>
<td>36</td>
<td>thru</td>
<td>46</td>
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<tr>
<td>Wall Design</td>
<td>57</td>
<td>thru</td>
<td>66</td>
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<tr>
<td>Foundation Design</td>
<td>77</td>
<td>thru</td>
<td>86</td>
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<tr>
<td>Lateral Load Resisting System Design</td>
<td>31</td>
<td>thru</td>
<td>35</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
<td></td>
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</table>

PROJECT DESCRIPTION

The “Itd Carey Maintenance Building Addition” project ...

DESCRIPTION OF STRUCTURAL ELEMENTS

Roof Framing:
The roof framing is of I-Joist

Floor Framing:
The floor is concrete

Columns:
The columns are HSS steel

Bearing Walls:
The bearing walls are CMU

Foundation:
The foundation is concrete

Lateral Load Resisting System:
The lateral load resisting system is CMU walls

AHJ ENGINEERS, PC
STRUCTURAL CONSULTANTS

5418 N. Eagle Rd. #140
Boise, Idaho 83713
208.323.0199

Project#18034

Itd Carey Maintenance Building Addition
# ENGINEERING INFORMATION SHEET

**Code:** 2015 International Building Code  
**Risk Category (Table 1604.5):** II

## GRAVITY LOADS

### Roof Loading Case #1 (New)

<table>
<thead>
<tr>
<th>Item</th>
<th>Load (psf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishes</td>
<td>2.0</td>
</tr>
<tr>
<td>Sheathing/Decking</td>
<td>2.5</td>
</tr>
<tr>
<td>Framing</td>
<td>3.5</td>
</tr>
<tr>
<td>Insulation</td>
<td>3.0</td>
</tr>
<tr>
<td>MEP</td>
<td>1.5</td>
</tr>
<tr>
<td>Ceiling</td>
<td>2.5</td>
</tr>
<tr>
<td>Miscellaneous</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17.0</strong></td>
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</table>

**Snow Loading**  
(ASCE 7-10 Chapter 7)

<table>
<thead>
<tr>
<th>p_0</th>
<th>49.0 psf</th>
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</thead>
<tbody>
<tr>
<td>p_f</td>
<td>50.0 psf</td>
</tr>
<tr>
<td>I_s</td>
<td>1.0</td>
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</table>

### Roof Loading Case #2 (Existing)

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<tr>
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<tr>
<td>Framing</td>
<td>3.5</td>
</tr>
<tr>
<td>Insulation</td>
<td>2.5</td>
</tr>
<tr>
<td>MEP</td>
<td>1.5</td>
</tr>
<tr>
<td>Ceiling</td>
<td>2.5</td>
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<tr>
<td>Miscellaneous</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16.5</strong></td>
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</table>

**Snow Loading**  
(ASCE 7-10 Chapter 7)

<table>
<thead>
<tr>
<th>p_0</th>
<th>49.0 psf</th>
</tr>
</thead>
<tbody>
<tr>
<td>p_f</td>
<td>50.0 psf</td>
</tr>
<tr>
<td>I_s</td>
<td>1.0</td>
</tr>
</tbody>
</table>

### Floor Loading Case #1

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<td>psf</td>
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<tr>
<td>Sheathing/Decking</td>
<td>psf</td>
</tr>
<tr>
<td>Framing</td>
<td>psf</td>
</tr>
<tr>
<td>Insulation</td>
<td>psf</td>
</tr>
<tr>
<td>MEP</td>
<td>psf</td>
</tr>
<tr>
<td>Ceiling</td>
<td>psf</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>psf</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>psf</td>
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**Live Loading**  
(IBC Section 1607)

### Floor Loading Case #2

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<td>psf</td>
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<tr>
<td>Framing</td>
<td>psf</td>
</tr>
<tr>
<td>Insulation</td>
<td>psf</td>
</tr>
<tr>
<td>MEP</td>
<td>psf</td>
</tr>
<tr>
<td>Ceiling</td>
<td>psf</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>psf</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>psf</td>
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**Live Loading**  
(IBC Section 1607)

## LATERAL LOADS

### Seismic Design Criteria  
(ASCE 7-10 Chapters 11-22)

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Class</td>
<td>D</td>
</tr>
<tr>
<td>S_psf</td>
<td>0.307</td>
</tr>
<tr>
<td>S_di</td>
<td>0.166</td>
</tr>
<tr>
<td>I_p (Table 1.5-2)</td>
<td>1.0</td>
</tr>
<tr>
<td>Design Category</td>
<td>C</td>
</tr>
<tr>
<td>(Table 11.6-1 &amp; 11.6-2)</td>
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</tr>
<tr>
<td>Response Modification, R</td>
<td>3.5</td>
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### Wind Design Criteria  
(ASCE 7-10 Chapters 26-31)

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<tbody>
<tr>
<td>Basic Wind Speed</td>
<td>115</td>
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<tr>
<td>(3-sec. gust, Fig. 26.5-1A)</td>
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<tr>
<td>Exposure Category</td>
<td>C</td>
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<tr>
<td>(ASCE 7 Section 26.7.3)</td>
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<tr>
<td>I_w</td>
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## MATERIALS

### Soils

<table>
<thead>
<tr>
<th>Design Bearing Pressure:</th>
<th>2500 psf</th>
</tr>
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<tbody>
<tr>
<td>Source:</td>
<td>Assumed</td>
</tr>
<tr>
<td>Geotechnical Report by:</td>
<td>TID BORING LOGS ON (E)DRG. Report no.</td>
</tr>
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### Concrete F's:

<table>
<thead>
<tr>
<th>Component</th>
<th>psi</th>
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</thead>
<tbody>
<tr>
<td>Footings and Interior slab on grade:</td>
<td>2500</td>
</tr>
<tr>
<td>Concrete over steel deck:</td>
<td>3500</td>
</tr>
<tr>
<td>Stem walls and tilt-up panels:</td>
<td>4000</td>
</tr>
<tr>
<td>Beams and columns:</td>
<td>4000</td>
</tr>
<tr>
<td>Exterior Slab on grade:</td>
<td>4000</td>
</tr>
<tr>
<td>Reinforcing:</td>
<td>60000</td>
</tr>
</tbody>
</table>

### Masonry

<table>
<thead>
<tr>
<th>Component</th>
<th>psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>F'm:</td>
<td>1500</td>
</tr>
<tr>
<td>Mortar (ASTM C270, type S)</td>
<td>1800</td>
</tr>
<tr>
<td>Grout (ASTM C476)</td>
<td>2000</td>
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<tr>
<td>Reinforcing:</td>
<td>60000</td>
</tr>
</tbody>
</table>

### Wood

<table>
<thead>
<tr>
<th>Grade/Species</th>
<th>Sawn Lumber DF#2 (or brt.)</th>
<th>Glulam 24F-V4 (DF/DF)</th>
<th>Microlam 1.9 E</th>
<th>Parallam 2.0 E</th>
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<tbody>
<tr>
<td>F_b:</td>
<td>900 psi</td>
<td>2400 psi</td>
<td>2600 psi</td>
<td>2900 psi</td>
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<tr>
<td>F_c:</td>
<td>1350 psi</td>
<td>1650 psi</td>
<td>2510 psi</td>
<td>2900 psi</td>
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<td>F_y:</td>
<td>180 psi</td>
<td>265 psi</td>
<td>285 psi</td>
<td>290 psi</td>
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<tr>
<td>E:</td>
<td>1600000 psi</td>
<td>1800000 psi</td>
<td>1900000 psi</td>
<td>2000000 psi</td>
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### Structural Steel fy:

<table>
<thead>
<tr>
<th>Component</th>
<th>ksi</th>
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</thead>
<tbody>
<tr>
<td>Wide Flange ASTM A992:</td>
<td>50</td>
</tr>
<tr>
<td>Channels, Angles, Plates &amp; Bars (ASTM A36):</td>
<td>36</td>
</tr>
<tr>
<td>HSS Rectangular (ASTM A500):</td>
<td>46</td>
</tr>
<tr>
<td>HSS Round (ASTM A500):</td>
<td>42</td>
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<tr>
<td>Pipe (ASTM A53 or A501):</td>
<td>35</td>
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<tr>
<td>Bolts (ASTM):</td>
<td>A325</td>
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</table>

### Cold Formed Structural Steel fy:

<table>
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<tr>
<td>33- and 43- mil (ASTM C955):</td>
<td>33</td>
</tr>
<tr>
<td>54-, 68-, and 97-mil (ASTM 955):</td>
<td>50</td>
</tr>
</tbody>
</table>
**Design Criteria**

**CAREY, ID**

- Latitude: 43.317037
- Longitude: -113.944970
- Elevation: 4783'
- Wind: 115 MPH, EXP C

**Design Loads**

<table>
<thead>
<tr>
<th></th>
<th>Existing</th>
<th>New</th>
<th>Canopy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dead</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Roofing</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Sheathing</td>
<td>1.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Skps Shtg</td>
<td>2.0</td>
<td>3.5</td>
<td>3.5</td>
</tr>
<tr>
<td>Trusses/Pfrs</td>
<td>2.5</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Invltn</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Ceiling</td>
<td>1.5</td>
<td>1.5</td>
<td>0.5</td>
</tr>
<tr>
<td>M/E/P</td>
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<td>2.0</td>
<td>1.5</td>
</tr>
<tr>
<td>Misc.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Existing Total:** 16.5 PSF
- **New Total:** 17.0 PSF
- **Canopy:** 10.0 PSF

**Snow:** 50 PSF Roof Per CO Website

**AHJ NO.** 18034
**Project:** ITD CAREY, ID
**Date:** 4/16/19
**By:** DH
**Sheet No.:** /4

AHJ ENGINEERS, PC
STRUCTURAL CONSULTANTS
Snow Load

\[ P_g = 49 \text{ psf} \text{ PER U of I} \Rightarrow P_f = 0.7(1.0)(1.1)(0.49) = 33 \text{ psf} \]
\[ P_f = 50 \text{ psf} \text{ BLAINE COUNTY} \]

Check for 3/12 slope reduction \( C_t = 1.1 \text{ psf} \) \( C_s = 0.65 \)

\[ P_s = C_s P_f = 0.65(50 \text{ psf}) = 32.5 \text{ psf} \Rightarrow 33 \]

Unobstructed slippery \( \uparrow \)

USE BASIC SNOW LOAD

OK \( = 33 \text{ psf} \)
Building Code Basics
All requirements are found in the Blaine County Code, Title 7. A copy of this Code may be obtained from the Building Services Department. With this Code, Blaine County adopts the 2012 International Building Code with local Amendments.

LIVE ROOF SNOW LOADS
North Fork to Smiley Creek 150 p.s.f.
North of Ketchum to North Fork 125 p.s.f.
West of Ketchum to western end of platted
Lower Board Ranch 110 p.s.f.
West of western end of platted
Lower Board Ranch 125 p.s.f.
East of Triumph 125 p.s.f.
No. of Bellevue to So. of Ketchum 100 p.s.f.
Picabo to South of Bellevue 65 p.s.f.
Carey including So. and E. of Carey 50 p.s.f.

Seismic
Seismic Categories are to be designated in reference to Chapter 16 of the 2012 International Building Code. Seismic engineering calculations must include 15% of the Live Roof snow load in reference to Blaine County Building Code.

Wind Factors
90 miles per hour. Exposures B and C. This factor is region specific. Please ask the Building Department for your area.

Fees
Fees are in accordance with the 2012 International Building Code as adopted by Blaine County. Additional fees include 40% of the building permit plan check fee for a Fire Department Plan Check fee. If the valuation of your project is greater than $200,000, a $1,500 non-refundable partial payment of the permit fee will be required for your application to be accepted. Also, it is required that a final inspection deposit be made when obtaining your permit. This amount will be refunded to you after you final inspection is approved. Fee schedule is available upon request.

Please visit our website at www.blaineCounty.org

BLAINE COUNTY BUILDING SERVICES

How can I expedite my project through the BUILDING PERMIT PROCESS?

Blaine County Building Services
Jeff Giese, Building Official
Karen Osborne, Permit Tech / Office Manager
219 First Avenue South, Suite 208
Hailey, Idaho 83333
Phone (208) 788-5573
Fax (208) 788-5576
building@co.blaine.id.us
Revised 3-29-2016
**Roof Framing**

**Sheathing**

Superimposed Loads

- Dead
  - 2.5 PSF

- Snow
  - 32.5 PSF

Total
  - 35 PSF

**Use 23/32" APA Rated Sheathing 43/24**

**Rafters**

8:12 slope

Say 2'-0".

- WD = 17 PSF (2) = 34 PLF
- WS = 33 PSF (2) = 66 PLF

100 PLF

**Use 1176" TJI 210 @ 24" O.C.**

- Rxn = 100 (17/2) = 600

**Use LBX Hangers SLOPED**
### TABLE 2304.8(1)
**ALLOWABLE SPANS FOR LUMBER FLOOR AND ROOF SHEATHING**

<table>
<thead>
<tr>
<th>SPAN (inches)</th>
<th>MINIMUM NET THICKNESS (inches) OF LUMBER PLACED</th>
<th>Perpendicular to supports</th>
<th>Diagonally to supports</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Surfed dry*</td>
<td>Surfed unseasoned</td>
</tr>
<tr>
<td>Floors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>$\frac{3}{8}$</td>
<td>$\frac{3}{8}$, $\frac{3}{4}$</td>
<td>$\frac{3}{8}$</td>
</tr>
<tr>
<td>16</td>
<td>$\frac{5}{8}$</td>
<td>$\frac{5}{8}$, $\frac{3}{4}$</td>
<td>$\frac{5}{8}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roofs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>$\frac{3}{8}$</td>
<td>$\frac{3}{8}$, $\frac{3}{4}$</td>
<td>$\frac{3}{8}$</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm.

a. Installation details shall conform to Sections 2304.8.1 and 2304.8.2 for floor and roof sheathing, respectively.
b. Floor or roof sheathing complying with this table shall be deemed to meet the design criteria of Section 2304.8.
c. Maximum 19-percent moisture content.

### TABLE 2304.8(2)
**SHEATHING LUMBER, MINIMUM GRADE REQUIREMENTS: BOARD GRADE**

<table>
<thead>
<tr>
<th>SOLID FLOOR OR ROOF SHEATHING</th>
<th>SPACED ROOF SHEATHING</th>
<th>GRADING RULES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility</td>
<td>Standard</td>
<td>NLGA, WCLIB, WWPA</td>
</tr>
<tr>
<td>4 common or utility</td>
<td>3 common or standard</td>
<td>NLGA, WCLIB, WWPA, NSLB or NELMA</td>
</tr>
<tr>
<td>No. 3</td>
<td>No. 2</td>
<td>SPIB</td>
</tr>
<tr>
<td>Merchantable</td>
<td>Construction common</td>
<td>RIS</td>
</tr>
</tbody>
</table>

### TABLE 2304.8(3)
**ALLOWABLE SPANS AND LOADS FOR WOOD STRUCTURAL PANEL SHEATHING AND SINGLE-FLOOR GRADES CONTINUOUS OVER TWO OR MORE SPANS WITH STRENGTH AXIS PERPENDICULAR TO SUPPORTS**

#### SHEATHING GRADES

<table>
<thead>
<tr>
<th>Panel span rating roof/ floor span</th>
<th>Panel thickness (inches)</th>
<th>Maximum span (inches)</th>
<th>ROOF&lt;sup&gt;a&lt;/sup&gt;</th>
<th>FLOOR&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>With edge support&lt;sup&gt;c&lt;/sup&gt;</td>
<td>Without edge support&lt;sup&gt;c&lt;/sup&gt;</td>
<td>Total load (psf)</td>
</tr>
<tr>
<td>16/0</td>
<td>$\frac{1}{2}$</td>
<td>16</td>
<td>16</td>
<td>40</td>
</tr>
<tr>
<td>20/0</td>
<td>$\frac{1}{4}$</td>
<td>20</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>24/0</td>
<td>$\frac{1}{8}$</td>
<td>24</td>
<td>20&lt;sup&gt;d&lt;/sup&gt;</td>
<td>40</td>
</tr>
<tr>
<td>24/16</td>
<td>$\frac{1}{8}$, $\frac{1}{16}$</td>
<td>24</td>
<td>24</td>
<td>50</td>
</tr>
<tr>
<td>28/16</td>
<td>$\frac{1}{8}$, $\frac{1}{16}$</td>
<td>32</td>
<td>28</td>
<td>40</td>
</tr>
<tr>
<td>40/20</td>
<td>$\frac{1}{8}$, $\frac{1}{16}$</td>
<td>40</td>
<td>32</td>
<td>40</td>
</tr>
<tr>
<td>48/24</td>
<td>$\frac{1}{8}$, $\frac{1}{16}$</td>
<td>48</td>
<td>36</td>
<td>45</td>
</tr>
<tr>
<td>54/32</td>
<td>$\frac{1}{8}$, 1</td>
<td>54</td>
<td>40</td>
<td>45</td>
</tr>
<tr>
<td>60/32</td>
<td>$\frac{1}{8}$, $\frac{1}{16}$</td>
<td>60</td>
<td>48</td>
<td>45</td>
</tr>
</tbody>
</table>

#### SINGLE FLOOR GRADES

<table>
<thead>
<tr>
<th>Panel span rating</th>
<th>Panel thickness (inches)</th>
<th>Maximum span (inches)</th>
<th>ROOF&lt;sup&gt;a&lt;/sup&gt;</th>
<th>FLOOR&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>With edge support&lt;sup&gt;c&lt;/sup&gt;</td>
<td>Without edge support&lt;sup&gt;c&lt;/sup&gt;</td>
<td>Total load (psf)</td>
</tr>
<tr>
<td>16 o.c.</td>
<td>$\frac{1}{4}$, $\frac{1}{16}$</td>
<td>24</td>
<td>24</td>
<td>50</td>
</tr>
<tr>
<td>20 o.c.</td>
<td>$\frac{1}{4}$, $\frac{1}{16}$</td>
<td>32</td>
<td>32</td>
<td>40</td>
</tr>
<tr>
<td>24 o.c.</td>
<td>$\frac{1}{8}$, $\frac{1}{16}$</td>
<td>48</td>
<td>36</td>
<td>35</td>
</tr>
<tr>
<td>32 o.c.</td>
<td>$\frac{1}{8}$, 1</td>
<td>48</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>48 o.c.</td>
<td>$\frac{1}{8}$, $\frac{1}{16}$</td>
<td>60</td>
<td>48</td>
<td>50</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kN/m².

a. Applies to panels 24 inches or wider.
b. Floor and roof sheathing complying with this table shall be deemed to meet the design criteria of Section 2304.8.
c. Uniform load deflection limitations $\frac{1}{10}$ of span under live load plus dead load, $\frac{1}{4}$ of span under live load only.
d. Panel edges shall have approved tongue-and-groove joints or shall be supported with blocking unless $\frac{1}{8}$-inch minimum thickness underlayment or $\frac{1}{8}$-inch, inches of approved cellular or lightweight concrete is placed over the subfloor, or finish floor is $\frac{1}{8}$-inch wood strip. Allowable uniform load based on deflection of $\frac{1}{10}$ of span is 100 pounds per square foot except the span rating of 48 inches on center is based on a total load of 65 pounds per square foot.
e. Allowable load at maximum span.
f. Tongue-and-groove edges, panel edge clips (one midway between each support, except two equally spaced between supports 48 inches on center). lumber blocking or other. Only lumber blocking shall satisfy blocked diaphragm requirements.
g. For $\frac{1}{8}$-inch panel, maximum span shall be 24 inches.
h. Span is permitted to be 24 inches on center where $\frac{1}{8}$-inch wood strip flooring is installed at right angles to joist.
i. Span is permitted to be 24 inches on center for floors where $\frac{1}{8}$-inch of cellular or lightweight concrete is applied over the panels.

---

2015 INTERNATIONAL BUILDING CODE® 479
# Roof Load Tables

## Roof—115% and 125% Load Duration (PLF) for 6'-16' Spans

<table>
<thead>
<tr>
<th>Depth</th>
<th>6'</th>
<th>8'</th>
<th>10'</th>
<th>12'</th>
<th>14'</th>
<th>16'</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Snow</td>
<td>115%</td>
<td>125%</td>
<td>Non-Snow</td>
<td>Live Load</td>
<td>L/240</td>
</tr>
<tr>
<td>11</td>
<td>298</td>
<td>314</td>
<td>218</td>
<td>237</td>
<td>175</td>
<td>190</td>
</tr>
<tr>
<td>12</td>
<td>321</td>
<td>349</td>
<td>242</td>
<td>263</td>
<td>194</td>
<td>211</td>
</tr>
<tr>
<td>13</td>
<td>360</td>
<td>389</td>
<td>272</td>
<td>295</td>
<td>218</td>
<td>237</td>
</tr>
<tr>
<td>14</td>
<td>369</td>
<td>400</td>
<td>277</td>
<td>301</td>
<td>223</td>
<td>242</td>
</tr>
<tr>
<td>15</td>
<td>409</td>
<td>448</td>
<td>338</td>
<td>369</td>
<td>272</td>
<td>295</td>
</tr>
<tr>
<td>16</td>
<td>449</td>
<td>488</td>
<td>338</td>
<td>368</td>
<td>272</td>
<td>295</td>
</tr>
</tbody>
</table>

## Roof—115% and 125% Load Duration (PLF) for 18'-28' Spans

<table>
<thead>
<tr>
<th>Depth</th>
<th>18'</th>
<th>20'</th>
<th>22'</th>
<th>24'</th>
<th>26'</th>
<th>28'</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Snow</td>
<td>115%</td>
<td>125%</td>
<td>Non-Snow</td>
<td>Live Load</td>
<td>L/240</td>
</tr>
<tr>
<td>10</td>
<td>83</td>
<td>86</td>
<td>64</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>94</td>
<td>94</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>106</td>
<td>115</td>
<td>106</td>
<td>86</td>
<td>93</td>
<td>79</td>
</tr>
<tr>
<td>14</td>
<td>117</td>
<td>128</td>
<td>116</td>
<td>95</td>
<td>103</td>
<td>86</td>
</tr>
<tr>
<td>15</td>
<td>124</td>
<td>135</td>
<td>*</td>
<td>112</td>
<td>122</td>
<td>103</td>
</tr>
<tr>
<td>16</td>
<td>128</td>
<td>140</td>
<td>122</td>
<td>103</td>
<td>107</td>
<td>87</td>
</tr>
<tr>
<td>17</td>
<td>142</td>
<td>155</td>
<td>142</td>
<td>122</td>
<td>119</td>
<td>95</td>
</tr>
<tr>
<td>18</td>
<td>152</td>
<td>165</td>
<td>174</td>
<td>155</td>
<td>145</td>
<td>122</td>
</tr>
<tr>
<td>19</td>
<td>160</td>
<td>176</td>
<td>188</td>
<td>168</td>
<td>158</td>
<td>142</td>
</tr>
<tr>
<td>20</td>
<td>176</td>
<td>194</td>
<td>212</td>
<td>204</td>
<td>204</td>
<td>195</td>
</tr>
</tbody>
</table>

* Indicates that Total Load value controls.

### Slope Factors

<table>
<thead>
<tr>
<th>Slope</th>
<th>2/12</th>
<th>3/12</th>
<th>4/12</th>
<th>5/12</th>
<th>6/12</th>
<th>8/12</th>
<th>8/12</th>
<th>9/12</th>
<th>10/12</th>
<th>11/12</th>
<th>12/12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor</td>
<td>1.02</td>
<td>1.03</td>
<td>1.04</td>
<td>1.05</td>
<td>1.06</td>
<td>1.08</td>
<td>1.10</td>
<td>1.12</td>
<td>1.14</td>
<td>1.16</td>
<td>1.18</td>
</tr>
</tbody>
</table>

### How to Use These Tables

1. Calculate actual total load in pounds per linear foot (plf).
2. Select appropriate Roof Joist Horizontal Clear Span. For slopes greater than 2:12, approximate the increased dead load by multiplying the joist horizontal clear span by the Slope Factor above.
3. Scan down the column to find a TJ® joist that meets or exceeds actual total load.

### General Notes

- Tables are based on:
  - Minimum bearing length of 1 1/4" end and 3 1/4" intermediate, without web stiffeners.
  - Uniform loads.
  - More restrictive of simple or continuous span.
  - Minimum roof slope of 4:12.
- Total Load values are limited to deflection of L/180. For stiffer deflection criteria, use the Live Load L/240 values.

---

17 Trus Joist® TJ® Joist Specifier's Guide TJ-4000 | December 2013
REMOVE REAR WALL, ADD POST & BEAM

TYPICAL BEAM SPAN = 24'

\[ W_b = 16.5 \times (4' 1/2) + 17 \times (12') + 100 \text{ plf} = 6036 \]
\[ W_s = 33 \times (6' 1/2) = 1007 \]
\[ W_T = 1613 \]

USE \( W18 \times 45 \) w/ \( c = 0.5'' \)

AT CRANE

USE SAME

COLUMN AT STEEL BEAM

- TYPICAL
  \[ P_b = (2) \times 7.81 = 15.62 \]
  \[ P_s = (2) \times 12.08 = 24.16 \]
  \[ = 39.78 k \]

- WITH BRIDGE CRANE (3 TON) ASSUME ALL IN ONE CORNER
  \[ P_b = 15.62 + 600 \times 1 = 16.22 k \]
  \[ P_s = 24.16 \]
  \[ P_c = 10.0 k \]

- AT END OF SPAN
  \[ P_b = 7.81 k \]
  \[ P_s = 12.08 k \]

BUT USE HSS \( 6 \times 6 \times 3/16 \) FOR ECCENTRIC CRANE

AHJ NO. 18034
PROJECT LTD CARRY, ID

DATE: 4/22/18
BY: DH

SHEET NO. 11

AHJ ENGINEERS, PC
STRUCTURAL CONSULTANTS
Steel Beam
Lic. #: KW-06001594
Description: Typical beam at wall removal

CODE REFERENCES
Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set: ASCE 7-10

Material Properties
Analysis Method: Allowable Strength Design
Beam Bracing: Beam is Fully Braced against lateral-torsional buckling
Bending Axis: Major Axis Bending

\[
\begin{align*}
D(0.606) & \times S(1.007) \\
W12\times45 \\
\text{Span} &= 24.0 \text{ ft}
\end{align*}
\]

Applied Loads
Beam self weight calculated and added to loading:
Uniform Load: \( D = 0.606 \), \( S = 1.007 \) kft, Tributary Width = 1 ft

Service loads entered. Load Factors will be applied for calculations.

DESIGN SUMMARY
Maximum Bending Stress Ratio = \( \frac{0.745}{1} \)
Section used for this span: W12x45
Ma : Applied
Mn / Omega : Allowable
Load Combination: +D+S
Location of maximum on span: 12,000 ft
Span # where maximum occurs: Span # 1
Maximum Deflection:
Max Downward Transient Deflection
0.748 in Ratio = 384 >=240
Max Upward Transient Deflection
0.748 in Ratio = 384 >=240
Max Downward Total Deflection
1.232 in Ratio = 234 >=180
Max Upward Total Deflection
0.000 in Ratio = 0 <180

Maximum Shear Stress Ratio = \( \frac{0.245}{1} \)
Section used for this span: W12x45
Va : Applied
Vn/Omega : Allowable
Load Combination: +D+S
Location of maximum on span: 0,000 ft
Span # where maximum occurs: Span # 1

Vertical Reactions
\[
\begin{align*}
\text{Load Combination} & \quad \text{Support 1} & \quad \text{Support 2} \\
\text{Overall Max} & \quad 19.896 & \quad 19.896 \\
\text{Overall Min} & \quad 4.667 & \quad 4.667 \\
\text{D Only} & \quad 7.812 & \quad 7.812 \\
\text{+D+S} & \quad 19.896 & \quad 19.896 \\
\text{+D+0.75S} & \quad 16.785 & \quad 16.785 \\
\text{+D+0.60D} & \quad 4.667 & \quad 4.667 \\
\text{S Only} & \quad 12.084 & \quad 12.084
\end{align*}
\]

Support notation: Far left is #1
Values in KIPS

\[
\begin{align*}
1.23 - 0.75 \\
0.48'' \text{ dead load defl. OK} & \quad \text{CONSIDER } C = 0.5''
\end{align*}
\]
Steel Beam

Description: Typical beam at wall removal

![Graph of Moment vs Distance](image1)

![Graph of Shear vs Distance](image2)
### Summary of Values per Beam Span

#### Beam Span Moments & Shears at Incremental Location

<table>
<thead>
<tr>
<th>Load Type/Combination</th>
<th>Span Location (ft)</th>
<th>Span ID</th>
<th>Shear (k)</th>
<th>Moment (ft-k)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D Only</td>
<td>0.00</td>
<td>Span 1</td>
<td>7.812</td>
<td>0.000</td>
</tr>
<tr>
<td>D Only</td>
<td>2.40</td>
<td>Span 1</td>
<td>6.250</td>
<td>16.874</td>
</tr>
<tr>
<td>D Only</td>
<td>4.80</td>
<td>Span 1</td>
<td>4.687</td>
<td>29.998</td>
</tr>
<tr>
<td>D Only</td>
<td>7.20</td>
<td>Span 1</td>
<td>3.125</td>
<td>39.372</td>
</tr>
<tr>
<td>D Only</td>
<td>9.60</td>
<td>Span 1</td>
<td>1.562</td>
<td>44.997</td>
</tr>
<tr>
<td>D Only</td>
<td>12.00</td>
<td>Span 1</td>
<td>0.000</td>
<td>46.872</td>
</tr>
<tr>
<td>D Only</td>
<td>14.40</td>
<td>Span 1</td>
<td>-1.562</td>
<td>44.997</td>
</tr>
<tr>
<td>D Only</td>
<td>16.80</td>
<td>Span 1</td>
<td>-3.125</td>
<td>39.372</td>
</tr>
<tr>
<td>D Only</td>
<td>19.20</td>
<td>Span 1</td>
<td>-4.687</td>
<td>29.998</td>
</tr>
<tr>
<td>D Only</td>
<td>21.60</td>
<td>Span 1</td>
<td>-6.250</td>
<td>16.874</td>
</tr>
<tr>
<td>D Only</td>
<td>24.00</td>
<td>Span 1</td>
<td>-7.812</td>
<td>0.000</td>
</tr>
<tr>
<td>+D+S</td>
<td>0.00</td>
<td>Span 1</td>
<td>19.896</td>
<td>0.000</td>
</tr>
<tr>
<td>+D+S</td>
<td>2.40</td>
<td>Span 1</td>
<td>15.917</td>
<td>42.975</td>
</tr>
<tr>
<td>+D+S</td>
<td>4.80</td>
<td>Span 1</td>
<td>11.938</td>
<td>76.401</td>
</tr>
<tr>
<td>+D+S</td>
<td>7.20</td>
<td>Span 1</td>
<td>7.958</td>
<td>100.276</td>
</tr>
<tr>
<td>+D+S</td>
<td>9.60</td>
<td>Span 1</td>
<td>3.979</td>
<td>114.601</td>
</tr>
<tr>
<td>+D+S</td>
<td>12.00</td>
<td>Span 1</td>
<td>0.000</td>
<td>119.376</td>
</tr>
<tr>
<td>+D+S</td>
<td>14.40</td>
<td>Span 1</td>
<td>-3.979</td>
<td>114.601</td>
</tr>
<tr>
<td>+D+S</td>
<td>16.80</td>
<td>Span 1</td>
<td>-7.958</td>
<td>100.276</td>
</tr>
<tr>
<td>+D+S</td>
<td>19.20</td>
<td>Span 1</td>
<td>-11.938</td>
<td>76.401</td>
</tr>
<tr>
<td>+D+S</td>
<td>21.60</td>
<td>Span 1</td>
<td>-15.917</td>
<td>42.975</td>
</tr>
<tr>
<td>+D+S</td>
<td>24.00</td>
<td>Span 1</td>
<td>-19.896</td>
<td>0.000</td>
</tr>
<tr>
<td>+D+0.750S</td>
<td>0.00</td>
<td>Span 1</td>
<td>16.875</td>
<td>0.000</td>
</tr>
</tbody>
</table>
### Steel Beam

**Beam Span Moments & Shears at Incremental Location**

<table>
<thead>
<tr>
<th>Load Type/Combination</th>
<th>Span Location (ft)</th>
<th>Span ID</th>
<th>Shear (k)</th>
<th>Moment (ft-k)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+D+0.750S</td>
<td>2.40</td>
<td>Span 1</td>
<td>13.500</td>
<td>36.450</td>
</tr>
<tr>
<td>+D+0.750S</td>
<td>4.80</td>
<td>Span 1</td>
<td>10.125</td>
<td>64.800</td>
</tr>
<tr>
<td>+D+0.750S</td>
<td>7.20</td>
<td>Span 1</td>
<td>6.750</td>
<td>85.050</td>
</tr>
<tr>
<td>+D+0.750S</td>
<td>9.60</td>
<td>Span 1</td>
<td>3.375</td>
<td>97.200</td>
</tr>
<tr>
<td>+D+0.750S</td>
<td>12.00</td>
<td>Span 1</td>
<td>0.000</td>
<td>101.250</td>
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### Beam Span Deflections at Incremental Locations

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### Steel Beam

**Lic. #: KW-06001594**

**Description:** Typical beam at wall removal

#### Beam Span Deflections at Incremental Locations

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### Beam Span Deflections at Incremental Locations

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Steel Beam

Description: Beam at wall removal with crane

CODE REFERENCES
Calculations per AISC 360-10, IBC 2015, ASCE 7-10
Load Combination Set: ASCE 7-10

Material Properties

Analysis Method: Allowable Strength Design
Beam Bracing: Beam is Fully Braced against lateral-torsional buckling
Bending Axis: Major Axis Bending

Fy: Steel Yield: 50.0 ksi
E: Modulus: 29,000.0 ksi

Applied Loads
Beam self weight calculated and added to loading
Uniform Load: D = 0.6080, S = 1.007 k/ft, Tributary Width = 1.0 ft
Point Load: D = 0.30, L = 3.0 k @ 0.50 ft

Service loads entered. Load Factors will be applied for calculations.

DESIGN SUMMARY

Maximum Bending Stress Ratio = 0.746 : 1
Section used for this span
Ma : Applied 119,451 k-ft
Mn / Omega : Allowable 160,180 k-ft

Load Combination +D+S
Location of maximum on span 12,000 ft
Span # where maximum occurs Span # 1

Maximum Deflection
Max Downward Transient Deflection 0.748 in Ratio = 384 >=340
Max Upward Transient Deflection 0.748 in Ratio = 384 >=240
Max Downward Total Deflection 1.233 in Ratio = 234 >=180
Max Upward Total Deflection 0.000 in Ratio = 0 <180

Vertical Reactions

Load Combination Support 1 Support 2
Overall MAXimum 20.190 19.902
Overall MINimum 2.938 0.063
D Only 8.106 7.818
+D+L 11.043 7.881
+D+S 20.190 19.902
+D+0.750L 10.309 7.886
+D+0.750L+0.750S 19.972 16.928
+0.80D 4.883 4.891
L Only 2.938 0.063
S Only 12.084 12.084

Support notation: Far left is #1
Values in KIPS
Steel Beam

Description: Beam at wall removal with crane

Moment (k-ft)

Distance (ft)

- D Only
- +D+L
- +D+S
- +D+0.75DL
- +D+0.75DL+0.75DS
- +D+0.60D

Shear (k)

Distance (ft)

- D Only
- +D+L
- +D+S
- +D+0.75DL
- +D+0.75DL+0.75DS
- +D+0.60D
Steel Beam
Lic. #: KW-06001594
Description: Beam at wall removal with crane

![Graph showing deflection vs distance for different load combinations.]

Summary of Values per Beam Span
Beam Span Moments & Shears at Incremental Location

<table>
<thead>
<tr>
<th>Load Type/ Combination</th>
<th>Span Location (ft)</th>
<th>Span ID</th>
<th>Shear (k)</th>
<th>Moment (ft-k)</th>
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Note: The graph shows the deflection of the beam at various points along its span, with different load combinations indicated by symbols in the legend.
### Steel Beam

**Beam Span Moments & Shears at Incremental Location**

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<tr>
<th>Load Type Combination</th>
<th>Span Location (ft)</th>
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<th>Shear (k)</th>
<th>Moment (ft-k)</th>
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## Steel Beam

**Lic. #: KW-06001594**

**Description:** Beam at wall removal with crane

### Beam Span Deflections at Incremental Locations

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Steel Column
Lic. #: KW-06001594

Description: Typical at new steel beam

Code References
Calculations per AISC 360-10, IBC 2015, CBC 2016, ASCE 7-10
Load Combinations Used: ASCE 7-10

General Information
Steel Section Name: HSS6x6x3/16
Analysis Method: Allowable Strength
Steel Stress Grade: 46 ksi
E: Elastic Bending Modulus: 29,000.0 ksi

Overall Column Height: 13.7 ft
Top & Bottom Fixity: Top & Bottom Pinned

Brace condition for deflection (buckling) along columns:
- X-X (width) axis:
  - Fully braced against buckling along X-X Axis
- Y-Y (depth) axis:
  - Fully braced against buckling along Y-Y Axis

Applied Loads
- Column self weight included: 199.061 lbs * Dead Load Factor
- AXIAL LOADS...
- Axial Load at 13.70 ft, Xecc = 2.0 in, Yecc = 0.250 in, D = 15.620, S = 24.160 k

Service loads entered. Load Factors will be applied for calculations.

DESIGN SUMMARY

Bending & Shear Check Results
PASS Max. Axial + Bending Stress Ratio = 0.7215 : 1
Load Combination:
- +D+S
Location of max. above base:
- 13.70 ft
At maximum location values are:
- Pa: Axial: 39.780 k
- Pn/Omega: Allowable: 109.629 k
- Ma-x: Applied: -0.8289 k-ft
- Mn-x/Omega: Allowable: 18.466 k-ft
- Ma-y: Applied: -6.630 k-ft
- Mny/Omega: Allowable: 18.466 k-ft

Maximum Load Reactions...
- Top along X-X: 0.4839 k
- Bottom along X-X: 0.4839 k
- Top along Y-Y: 0.06049 k
- Bottom along Y-Y: 0.06049 k

Maximum Load Deflections...
- Along Y-Y: -0.02689 in at 7.999 ft above base for load combination: +D+S
- Along X-X: -0.2152 in at 7.999 ft above base for load combination: +D+S

PASS Maximum Shear Stress Ratio = 0.01536 : 1
Load Combination:
- +D+S
Location of max. above base:
- 0.0 ft
At maximum location values are:
- Va: Applied: 0.4839 k
- Vn/Omega: Allowable: 31.506 k

Load Combination Results

<table>
<thead>
<tr>
<th>Load Combination</th>
<th>Maximum Axial + Bending Stress Ratio</th>
<th>Maximum Shear Ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stress Ratio</td>
<td>Status</td>
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<tr>
<td>D Only</td>
<td>0.230</td>
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<td>+D+S</td>
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<td>PASS</td>
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<tr>
<td>+D+0.750S</td>
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<td>PASS</td>
</tr>
<tr>
<td>+0.60D</td>
<td>0.138</td>
<td>PASS</td>
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Maximum Reactions

<table>
<thead>
<tr>
<th>Load Combination</th>
<th>Axial Reaction @ Base</th>
<th>X-X Axis Reaction @ Base</th>
<th>X-X Axis Reaction @ Top</th>
<th>Y-Y Axis Reaction @ Base</th>
<th>Y-Y Axis Reaction @ Top</th>
<th>Max - End Moments @ Base</th>
<th>Max - End Moments @ Top</th>
</tr>
</thead>
<tbody>
<tr>
<td>D Only</td>
<td>15.619</td>
<td>0.190</td>
<td>0.190</td>
<td>-0.024</td>
<td>0.024</td>
<td>-0.265</td>
<td>-2.603</td>
</tr>
<tr>
<td>+D+S</td>
<td>39.979</td>
<td>0.484</td>
<td>0.484</td>
<td>-0.060</td>
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<td>+D+0.750S</td>
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<td>0.114</td>
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<td>0.014</td>
<td>-0.195</td>
<td>-1.562</td>
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<tr>
<td>S Only</td>
<td>24.160</td>
<td>0.294</td>
<td>0.294</td>
<td>-0.037</td>
<td>0.037</td>
<td>-0.503</td>
<td>-4.027</td>
</tr>
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Note: Only non-zero reactions are listed.

Extreme Reactions

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<tr>
<th>Item</th>
<th>Extreme Value</th>
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<tbody>
<tr>
<td>Axial @ Base</td>
<td>Maximum</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
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</tbody>
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25
### Extreme Reactions

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<thead>
<tr>
<th>Item</th>
<th>Extreme</th>
<th>Axial Reaction @ Base</th>
<th>X-X Axis Reaction @ Base</th>
<th>k @ Base</th>
<th>Y-Y Axis Reaction @ Base</th>
<th>Mx - End Moments @ Base</th>
<th>k-ft</th>
<th>My - End Moments @ Base</th>
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<tbody>
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<td>Reaction, X-X Axis Base</td>
<td>Maximum</td>
<td>39.979</td>
<td>0.484</td>
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<td>-0.060</td>
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</table>

### Maximum Deflections for Load Combinations

<table>
<thead>
<tr>
<th>Load Combination</th>
<th>Max. X-X Deflection</th>
<th>Distance</th>
<th>Max. Y-Y Deflection</th>
<th>Distance</th>
</tr>
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<tbody>
<tr>
<td>D Only</td>
<td>-0.0846 in</td>
<td>7.999 ft</td>
<td>-0.011 in</td>
<td>7.999 ft</td>
</tr>
<tr>
<td>+D+5SF</td>
<td>-0.2152 in</td>
<td>7.999 ft</td>
<td>-0.027 in</td>
<td>7.999 ft</td>
</tr>
<tr>
<td>+D+0.75SF</td>
<td>-0.1825 in</td>
<td>7.999 ft</td>
<td>-0.023 in</td>
<td>7.999 ft</td>
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<tr>
<td>+0.60D</td>
<td>-0.0507 in</td>
<td>7.999 ft</td>
<td>-0.006 in</td>
<td>7.999 ft</td>
</tr>
<tr>
<td>S Only</td>
<td>-0.1307 in</td>
<td>7.999 ft</td>
<td>-0.016 in</td>
<td>7.999 ft</td>
</tr>
</tbody>
</table>

### Steel Section Properties: HSS6x6x3/16

- **Depth**: 6.000 in
- **Design Thick**: 0.174 in
- **Width**: 6.000 in
- **Wall Thick**: 0.187 in
- **Area**: 3.980 in²
- **Weight**: 14.530 lb

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Depth</strong></td>
<td>6.000 in</td>
</tr>
<tr>
<td><strong>Design Thick</strong></td>
<td>0.174 in</td>
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</tr>
<tr>
<td><strong>Area</strong></td>
<td>3.980 in²</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>14.530 lb</td>
</tr>
</tbody>
</table>

**Note**: Yog = 0.000 in
Steel Column

Description: Typical at new steel beam

Sketches
### Steel Column

**Lic. #:** KW-0001594  
**Description:** Typical at new steel beam with crane

### Code References

Calculations per AISC 360-10, IBC 2015, CBC 2016, ASCE 7-10

### Load Combinations Used: ASCE 7-10

### General Information

- **Steel Section Name:** HSS6x6x3/16  
- **Allowable Strength:** 46.0 ksi  
- **Elastic Bending Modulus:** 29,000.0 ksi

### Applied Loads

- Column self weight included: 199.061 lbs * Dead Load Factor
- **AXIAL LOADS...**  
  - Axial Load at 13.70 ft, Xc= 2.0 in, Yc= 0.250 in, D = 15.620, S = 24.160 k
  - Axial Load at 13.70 ft, D = 0.60, L = 6.0 k

### DESIGN SUMMARY

#### Bending & Shear Check Results

**PASS**  
Max. Axial+Bending Stress Ratio =  
Load Combination  
Location of max. above base  
At maximum location values are...  
Pa : Axial  
Pn / Omega : Allowable  
Mx : Applied  
Mn / Omega : Allowable  
Va : Applied  
Vm / Omega : Allowable  

<table>
<thead>
<tr>
<th>Load Combination</th>
<th>Maximum Load Reactions...</th>
<th>Maximum Load Deflections...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top along X-X</td>
<td>0.4839 k</td>
<td>7.999 ft above base</td>
</tr>
<tr>
<td>Bottom along X-X</td>
<td>0.4839 k</td>
<td></td>
</tr>
<tr>
<td>Top along Y-Y</td>
<td>0.06049 k</td>
<td>7.999 ft above base</td>
</tr>
<tr>
<td>Bottom along Y-Y</td>
<td>0.06049 k</td>
<td></td>
</tr>
</tbody>
</table>

**PASS**  
Maximum Shear Stress Ratio =  
Load Combination  
Location of max. above base  
At maximum location values are...  

<table>
<thead>
<tr>
<th>Load Combination</th>
<th>Maximum Shear Stress Ratio</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top along X-X</td>
<td>0.4839 k</td>
<td>7.999 ft above base</td>
</tr>
<tr>
<td>Bottom along X-X</td>
<td>0.4839 k</td>
<td></td>
</tr>
</tbody>
</table>

### Load Combination Results

<table>
<thead>
<tr>
<th>Load Combination</th>
<th>Maximum Axial + Bending Stress Ratios</th>
<th>Maximum Shear Stress Ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress Ratio</td>
<td>Status</td>
<td>Location</td>
</tr>
<tr>
<td>D Only</td>
<td>0.232</td>
<td>PASS</td>
</tr>
<tr>
<td>+D+L</td>
<td>0.344</td>
<td>PASS</td>
</tr>
<tr>
<td>+D+S</td>
<td>0.272</td>
<td>PASS</td>
</tr>
<tr>
<td>+D+0.750L</td>
<td>0.253</td>
<td>PASS</td>
</tr>
<tr>
<td>+D+0.750L+0.750S</td>
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<td>PASS</td>
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<tr>
<td>+0.60D</td>
<td>0.193</td>
<td>PASS</td>
</tr>
</tbody>
</table>

### Maximum Reactions

Note: Only non-zero reactions are listed.

<table>
<thead>
<tr>
<th>Load Combination</th>
<th>Axial Reaction @ Base</th>
<th>X-X Axis Reaction @ Top</th>
<th>k</th>
<th>Y-Y Axis Reaction @ Top</th>
<th>Mx - End Moments @ Base</th>
<th>My - End Moments @ Top</th>
</tr>
</thead>
<tbody>
<tr>
<td>D Only</td>
<td>16.419</td>
<td>0.190</td>
<td>0.190</td>
<td>-0.024</td>
<td>0.024</td>
<td>-0.325</td>
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<td>+D+L</td>
<td>22.419</td>
<td>0.190</td>
<td>0.190</td>
<td>-0.024</td>
<td>0.024</td>
<td>-0.325</td>
</tr>
<tr>
<td>+D+S</td>
<td>40.579</td>
<td>0.484</td>
<td>0.484</td>
<td>-0.060</td>
<td>0.080</td>
<td>-0.829</td>
</tr>
<tr>
<td>+D+0.750L</td>
<td>20.919</td>
<td>0.190</td>
<td>0.190</td>
<td>-0.024</td>
<td>0.024</td>
<td>-0.325</td>
</tr>
<tr>
<td>+D+0.750L+0.750S</td>
<td>39.093</td>
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<tr>
<td>+0.60D</td>
<td>9.851</td>
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<tr>
<td>L Only</td>
<td>6.000</td>
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</tbody>
</table>
## Steel Column

**Steel Column**

**Lic. #: KW-0501594**

**Description:** Typical at new steel beam with crane

**Note:** Only non-zero reactions are listed.

### Maximum Reactions

<table>
<thead>
<tr>
<th>Load Combination</th>
<th>Axial Reaction @ Base</th>
<th>X-X Axis Reaction @ Base</th>
<th>k</th>
<th>Y-Y Axis Reaction @ Base</th>
<th>Mx - End Moments @ Base</th>
<th>k-ft</th>
<th>My - End Moments @ Base</th>
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<tbody>
<tr>
<td>S Only</td>
<td>24.160</td>
<td>0.294</td>
<td>0.294</td>
<td>-0.037</td>
<td>0.037</td>
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### Extreme Reactions

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<tr>
<th>Item</th>
<th>Extreme Value</th>
<th>Axial Reaction @ Base</th>
<th>X-X Axis Reaction @ Base</th>
<th>k</th>
<th>Y-Y Axis Reaction @ Base</th>
<th>Mx - End Moments @ Base</th>
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<th>My - End Moments @ Base</th>
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<td>40.579</td>
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</tr>
<tr>
<td>*</td>
<td>Minimum</td>
<td>40.579</td>
<td></td>
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<tr>
<td>Moment, Y-Y Axis Top</td>
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<td>-0.060</td>
<td>0.060</td>
<td>-0.829</td>
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<tr>
<td>*</td>
<td>Minimum</td>
<td>40.579</td>
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### Maximum Deflections for Load Combinations

<table>
<thead>
<tr>
<th>Load Combination</th>
<th>Max. X-X Deflection</th>
<th>Distance</th>
<th>Max. Y-Y Deflection</th>
<th>Distance</th>
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<tbody>
<tr>
<td>D Only</td>
<td>-0.0845 in</td>
<td>7.999 ft</td>
<td>-0.011 in</td>
<td>7.999 ft</td>
</tr>
<tr>
<td>+D+L</td>
<td>-0.0845 in</td>
<td>7.999 ft</td>
<td>-0.011 in</td>
<td>7.999 ft</td>
</tr>
<tr>
<td>+D+S</td>
<td>-0.2152 in</td>
<td>7.999 ft</td>
<td>-0.027 in</td>
<td>7.999 ft</td>
</tr>
<tr>
<td>+D+0.750L</td>
<td>-0.0845 in</td>
<td>7.999 ft</td>
<td>-0.011 in</td>
<td>7.999 ft</td>
</tr>
<tr>
<td>+D+0.750L+0.750S</td>
<td>-0.1025 in</td>
<td>7.999 ft</td>
<td>-0.023 in</td>
<td>7.999 ft</td>
</tr>
<tr>
<td>+0.690</td>
<td>-0.0507 in</td>
<td>7.999 ft</td>
<td>-0.006 in</td>
<td>7.999 ft</td>
</tr>
<tr>
<td>L Only</td>
<td>0.0000 in</td>
<td>0.000 ft</td>
<td>0.000 in</td>
<td>0.000 ft</td>
</tr>
<tr>
<td>S Only</td>
<td>-0.1307 in</td>
<td>7.999 ft</td>
<td>-0.016 in</td>
<td>7.999 ft</td>
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**Steel Section Properties:**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
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<tbody>
<tr>
<td>HSS6x6x3/16</td>
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<tr>
<td>Depth</td>
<td>6.000 in</td>
</tr>
<tr>
<td>Design Thick</td>
<td>0.174 in</td>
</tr>
<tr>
<td>Width</td>
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</tr>
<tr>
<td>Wall Thick</td>
<td>0.187 in</td>
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<tr>
<td>Area</td>
<td>3.980 in²</td>
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<tr>
<td>Weight</td>
<td>14.530 lbf</td>
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<tr>
<td>Yxx</td>
<td>22.30 in⁴</td>
</tr>
<tr>
<td>J</td>
<td>35.000 in³⁴</td>
</tr>
<tr>
<td>Sxx</td>
<td>7.420 in³³</td>
</tr>
<tr>
<td>Rxx</td>
<td>2.370 in</td>
</tr>
<tr>
<td>Zxx</td>
<td>8.630 in³</td>
</tr>
<tr>
<td>Iyy</td>
<td>22.300 in³⁴</td>
</tr>
<tr>
<td>C</td>
<td>11.800 in³³</td>
</tr>
<tr>
<td>Syy</td>
<td>7.420 in³³</td>
</tr>
<tr>
<td>Ryy</td>
<td>2.370 in</td>
</tr>
<tr>
<td>Ye1</td>
<td>0.000 in</td>
</tr>
</tbody>
</table>

---

**Project Title:** ITD Maintenance Bldg, Carey, ID  
**Engineer:** dh  
**Project ID:** 18034  
**Licensee:** AHJ Engineers, P.C.
Steel Column
Lic. #: KW-05001694
Description: Typical at new steel beam with crane

Sketches
RAFTERS

\[ l = 8' \text{ on centers} \]

\[ w_{pl} = 10 \text{ psf}(2) = 20 \text{ plf} \]
\[ w_{lu} = 33 \text{ psf}(2') = 66 \text{ plf} \]
\[ 86 \text{ plf} \]

Use 2x6 DF #2 @ 24" OC.

BEAM

\[ l = 12' \]

\[ w_{pl} = 10 \text{ psf}(\frac{3}{2} + 2) = 60 \]
\[ w_{lu} = 33 \text{ psf}(6) = 198 \]
\[ 258 \text{ plf} \]

Use 4x10 DF #2

POST

\[ \text{RxN} = 1600 \text{#} \]

Use 4x4 DF #2

FOOTING

1750#

2000 psf = .85'

Use 16" SQ x 42" PIER

\[ (4) \#5 + H3 ties @ 8" OC \]
**CODE REFERENCES**

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

Load Combination Set: ASCE 7-10

**Material Properties**

<table>
<thead>
<tr>
<th>Analysis Method</th>
<th>Allowable Stress Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Combination</td>
<td>ASCE 7-10</td>
</tr>
<tr>
<td>Fb</td>
<td>900 psi</td>
</tr>
<tr>
<td>Fb -</td>
<td>900 psi</td>
</tr>
<tr>
<td>Fc - Phl</td>
<td>1350 psi</td>
</tr>
<tr>
<td>Fc - Perp</td>
<td>625 psi</td>
</tr>
<tr>
<td>Ft</td>
<td>180 psi</td>
</tr>
<tr>
<td>Density Repetitive Member Stress Increase</td>
<td>31.2 pcf</td>
</tr>
</tbody>
</table>

**Applied Loads**

Uniform Load: D = 0.020, S = 0.066, Tributary Width = 1.0 ft

**DESIGN SUMMARY**

| Maximum Bonding Stress Ratio | 0.706 : 1 |
| Section used for this span  | 2x6        |
| f₀ : Actual                 | 1,091.70 psi |
| fₐ : Allowable              | 1,547.33 psi |
| Load Combination            | +D+S       |
| Location of maximum on span | 4.000 ft   |
| Span # where maximum occurs | Span # 1   |
| Maximum Deflection          |            |
| Max Downward Transient Deflection | 0.184 in Ratio = 522 >=240 |
| Max Upward Transient Deflection | 0.000 in Ratio = 0 <240  |
| Max Downward Total Deflection | 0.240 in Ratio = 400 >=180 |
| Max Upward Total Deflection  | 0.000 in Ratio = 0 <180  |

| Maximum Shear Stress Ratio | 0.269 : 1 |
| Section used for this span | 2x6        |
| fₐ : Actual                | 55.70 psi |
| fₐ : Allowable              | 207.00 psi |
| Load Combination            | +D+S       |
| Location of maximum on span | Span # 1   |
| Span # where maximum occurs |            |

**Overall Maximum Deflections**

<table>
<thead>
<tr>
<th>Load Combination</th>
<th>Span</th>
<th>Max. &quot;Δ&quot; Defl</th>
<th>Location in Span</th>
<th>Load Combination</th>
<th>Max. &quot;Δ&quot; Defl</th>
<th>Location in Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>+D+S</td>
<td>1</td>
<td>0.2396</td>
<td>4.029</td>
<td>0.0000</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

**Vertical Reactions**

<table>
<thead>
<tr>
<th>Load Combination</th>
<th>Support 1</th>
<th>Support 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall MAXimum</td>
<td>0.344</td>
<td>0.344</td>
</tr>
<tr>
<td>Overall MINimum</td>
<td>0.264</td>
<td>0.264</td>
</tr>
<tr>
<td>D Only</td>
<td>0.080</td>
<td>0.080</td>
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<tr>
<td>+D+S</td>
<td>0.344</td>
<td>0.344</td>
</tr>
<tr>
<td>+D+0.750S</td>
<td>0.278</td>
<td>0.278</td>
</tr>
<tr>
<td>+D+0.600D</td>
<td>0.048</td>
<td>0.048</td>
</tr>
<tr>
<td>S Only</td>
<td>0.264</td>
<td>0.264</td>
</tr>
</tbody>
</table>
Wood Beam
Lic. #: KW-05001594
Description: covered exit beam

CODE REFERENCES
Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set: ASCE 7-10

Material Properties
Analysis Method: Allowable Stress Design
Load Combination ASCE 7-10
Fb+ 900.0 psi
Fb- 900.0 psi
Fc - Purl 1,350.0 psi
Fc - Perp 625.0 psi
Fv 180.0 psi
Fl 575.0 psi
E: Modulus of Elasticity
E: Modulus of Elasticity
Emod - xx 1,600.0 ksi
Emin - xx 580.0 ksi
Density 31.20pcf
Repetitive Member Stress Increase

Beam Bracing: Beam is Fully Braced against lateral-torsional buckling

Applied Loads
Beam self weight calculated and added to loads
Uniform Load: D = 0.060, S = 0.1980, Tributary Width = 1.0 ft

DESIGN SUMMARY
Maximum Bending Stress Ratio = 0.803
Section used for this span 4x10
fb : Actual 1,146.89 psi
FB : Allowable 1,428.30 psi
Load Combination +D+S
Location of maximum on span 6.000 ft
Span # where maximum occurs Span # 1
Maximum Deflection
Max Downward Transient Deflection 0.252 in
Max Upward Transient Deflection 0.000 in
Max Downward Total Deflection 0.337 in
Max Upward Total Deflection 0.000 in

Overall Maximum Deflections
Load Combination Span Max. *+ Defl Location in Span Load Combination Max. *+ Defl Location in Span
+D+S 1 0.3367 6.044 0.0000 0.000

Vertical Reactions
Load Combination Support 1 Support 2
Overall MAximum 1.590 1.590
Overall MInimum 1.188 1.188
D Only 0.402 0.402
+D+S 1.590 1.590
+D+0.750S 1.293 1.293
+0.80D 0.241 0.241

Design OK

Service loads entered. Load Factors will be applied for calculations.
### Wood Beam

**Lic. #:** KW-06001594  
**Description:** Covered exit beam

#### Vertical Reactions

<table>
<thead>
<tr>
<th>Load Combination</th>
<th>Support 1</th>
<th>Support 2</th>
<th>Values in KIPS</th>
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</thead>
<tbody>
<tr>
<td>5 Only</td>
<td>1.188</td>
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</table>
### Post Allowable Compression Loads for Douglas Fir–Larch

<table>
<thead>
<tr>
<th>Framing</th>
<th>Lumber</th>
<th>Perp. to Grain, P_{0,l}</th>
<th>Compression Parallel to Grain, P_c (100)</th>
<th>Compression Parallel to Grain, P_c (160)</th>
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<tbody>
<tr>
<td></td>
<td>Size</td>
<td>Grade</td>
<td>Nominal Top-Plate Height (ft.)</td>
<td>Nominal Top-Plate Height (ft.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>4-Inch Wall</td>
<td>2x4</td>
<td>#2</td>
<td>3,280</td>
<td>3,170</td>
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<td></td>
<td>3x4</td>
<td>#2</td>
<td>5,470</td>
<td>5,285</td>
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<td></td>
<td>(2) 2x4</td>
<td>#2</td>
<td>6,565</td>
<td>6,340</td>
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<td></td>
<td>4x4</td>
<td>#2</td>
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<td>4x6</td>
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<td>(2) 2x6</td>
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<tr>
<td></td>
<td>4x6</td>
<td>#2</td>
<td>12,300</td>
<td>11,430</td>
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<td></td>
<td>4x8</td>
<td>#1</td>
<td>18,905</td>
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<td></td>
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### Post Allowable Compression Loads for Southern Pine

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<th>Perp. to Grain, P_{0,l}</th>
<th>Compression Parallel to Grain, P_c (100)</th>
<th>Compression Parallel to Grain, P_c (160)</th>
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<tbody>
<tr>
<td></td>
<td>Size</td>
<td>Grade</td>
<td>Nominal Top-Plate Height (ft.)</td>
<td>Nominal Top-Plate Height (ft.)</td>
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<td></td>
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<td>8</td>
<td>9</td>
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<tr>
<td>4-Inch Wall</td>
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<td>#2</td>
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<td>(3) 2x4</td>
<td>#2</td>
<td>8,900</td>
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<tr>
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<td>4,660</td>
<td>4,660</td>
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<td>7,770</td>
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<tr>
<td></td>
<td>(2) 2x6</td>
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<td>9,325</td>
<td>9,325</td>
</tr>
<tr>
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<td></td>
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<td>#1</td>
<td>23,305</td>
<td>23,305</td>
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</table>

See footnotes on p. 385.
LINTELS

At rear wall

\( l = 4'8" \)

\( W_0 = 17 \text{ psf}(\frac{12}{2} + 2) = 136 \)

\( W_s = 33 \text{ psf}(8') = 264 \)

\( 400 \text{ klf} \)

Use 3" x 16" CMU Lintel w/ same full concrete (conservative)

(2) #5 top & bottom

\( \frac{1}{2} \) (2) #5 jamb bars

AHJ NO. 13024
PROJECT: JTD CAREY

DATE: 4/24

BY: DH

SHEET NO. 36
Masonry Beam

Lic. #: KW-05001594
Description: 4"-8" Intels

Code References
Calculations per ACI 530-14, IBC 2015, CBC 2016, ASCE 7-10
Load Combinations Used: ASCE 7-10

General Information

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
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<tbody>
<tr>
<td>f_m</td>
<td>1,500.0 psi</td>
</tr>
<tr>
<td>F_s</td>
<td>24,000.0 psi</td>
</tr>
<tr>
<td>Em = f_m</td>
<td>750.0</td>
</tr>
<tr>
<td>Wall Wt Mult</td>
<td>1.0</td>
</tr>
<tr>
<td>Block Type</td>
<td>Normal Wt</td>
</tr>
<tr>
<td>Lateral Wind Load</td>
<td>36.0 psf</td>
</tr>
<tr>
<td>Beam is Fully Braced?</td>
<td>Yes</td>
</tr>
<tr>
<td>Lateral Wall Weight Seismic Factor</td>
<td>0.330</td>
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</table>

Note! Shear calculated at "d/2" from edge of beam

Uniform Loads

<table>
<thead>
<tr>
<th>Start X</th>
<th>End X</th>
<th>Dead Load</th>
<th>L: Floor Live</th>
<th>Lr: Roof Live</th>
<th>S: Snow</th>
<th>W: Wind</th>
<th>E: Earthquake</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>0.0 ft</td>
<td>4.667 ft</td>
<td>0.1360</td>
<td>0.0</td>
<td>0.160</td>
<td>0.2640</td>
<td>0.0</td>
</tr>
<tr>
<td>#2</td>
<td>0.0 ft</td>
<td>4.667 ft</td>
<td>0.1360</td>
<td>0.0</td>
<td>0.160</td>
<td>0.2640</td>
<td>0.0</td>
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<tr>
<td>#3</td>
<td>0.0 ft</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>#4</td>
<td>0.0 ft</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

DESIGN SUMMARY

Maximum Stress Ratios... Vertical Lateral SRSS Combination
fb/Fb 0.1391 0.01603 0.140 : 1.00
fw/Fv 0.2633 0.02041 0.2641 : 1.00

Maximum Moment
Actual 1.394 k-ft 10.019 k-ft
Allowable k-ft

Maximum Loads for Load Combination: +D+S
Vertical Loads
Lateral Loads for Load Combination: +D+0.60W
0.07836 k-ft 4.887

Maximum Shear
Actual 11.473 psi 43.571 psi
Allowable psi

Minimum Mn = 1.3 * Fcr * S = 3.523 k-ft

Vertical Strength
As 0.620 in^2
rho 0.007395
np 0.1906
k (np)^2+2np)^.5-np 0.4556
j = 1 - k/3 0.8481
M:mmas=Fb j b d^2/2 10.019 k-ft
M:Stl = Fs As j d 11.564 k-ft

Lateral Strength (Checking lateral bending for span)
As 0.620 in^2
rho 0.007285
np 0.1881
k (np)^2+2np)^.5-np 0.4534
j = 1 - k/3 0.8489
M:mmas=Fb j b d^2/2 4.887 k-ft
M:Stl = Fs As j d 5.592 k-ft
<table>
<thead>
<tr>
<th>Load Combination</th>
<th>Mmax kft</th>
<th>Mallow kft</th>
<th>fv : Vert psi</th>
<th>Fv : Vert psi</th>
<th>Mactual kft</th>
<th>Mallow kft</th>
<th>fv psi</th>
<th>Fv psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>D Only</td>
<td>0.68</td>
<td>10.02</td>
<td>5.56</td>
<td>43.57</td>
<td>0.00</td>
<td>4.89</td>
<td>0.00</td>
<td>38.73</td>
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<tr>
<td>+D+Lr</td>
<td>1.11</td>
<td>10.02</td>
<td>9.14</td>
<td>43.57</td>
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### Design Maximum Combinations - Moments

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<th>Axial Load</th>
<th>Pu</th>
<th>k</th>
<th>0.2<em>fm</em>bt</th>
<th>k</th>
<th>Mcr</th>
<th>k-ft</th>
<th>Mu</th>
<th>k-ft</th>
<th>Phi</th>
<th>k-ft</th>
<th>Phi Mn</th>
<th>k-ft</th>
<th>As</th>
<th>in²</th>
<th>As Ratio</th>
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<td>0.44</td>
<td>0.03</td>
<td>0.90</td>
<td>1.33</td>
<td>0.078</td>
<td>0.0017</td>
<td>0.1034</td>
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### Design Maximum Combinations - Deflections

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<th>Mcr</th>
<th>k-ft</th>
<th>Mactual</th>
<th>k-ft</th>
<th>I gross</th>
<th>in⁴</th>
<th>Stiffness</th>
<th>I cracked</th>
<th>in⁴</th>
<th>I Effective</th>
<th>in⁴</th>
<th>Deflections</th>
<th>Defl. Ratio</th>
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## Masonry Slender Wall

**Description:** typ bearing wall

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### Reactions - Vertical & Horizontal

**Load Combination**

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<td>0.00 k</td>
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Results reported for "Strip Width" = 12 in.
## Masonry Slender Wall

**Lic. #**: KW-08001594
**Description**: typ bearing wall

### Reactions - Vertical & Horizontal

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<th>Load Combination</th>
<th>Base Horizontal</th>
<th>Top Horizontal</th>
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<td>0.0 k</td>
<td>0.01 k</td>
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<td>+D+0.60W</td>
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<td>0.07 k</td>
<td>0.521 k</td>
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<td>+D+0.70E</td>
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<td>0.521 k</td>
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<tr>
<td>+D+0.750Lr+0.450W</td>
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<td>Lr Only</td>
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<tr>
<td>E Only</td>
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<td>0.09 k</td>
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INTERIOR FIRE BARRIER WALL

CFS

h = 26'

USE 5 5/8 X 16 1/2 FS 24" OC

CONCRETE

h = 4'

P_top = 5 psf (26/2) = 605 plf

USE 8" X 4 3/4" HIGH WALL W/ 
#4 @ 18" VERT. 1 HOMZ W/ 
18" WIDE X 12" THICK ETA 0/90 W/ (2) #5 CONTINUOUS
**Cantilevered Retaining Wall**

**Lic. # : KW-08001594**

**Description:** 4' Interior fire barrier stem wall with CFS above

### Criteria
- **Retained Height** = 0.25 ft
- **Wall height above soil** = 4.00 ft
- **Slope Behind Wall** = 0.00 : 1
- **Height of Soil over Toe** = 2.00 in
- **Water height over heel** = 0.0 ft
- **Vertical component of active Lateral soil pressure options:**
  - NOT USED for Soil Pressure
  - NOT USED for Sliding Resistance
  - NOT USED for Overturning Resistance.

### Surcharge Loads
- **Surcharge Over Heel** = 0.6 psf
- **Used To Resist Sliding & Overturning**
  - **Surcharge Over Toe** = 0.0 psf
  - **Used for Sliding & Overturning**

### Axial Load Applied to Stem
- **Axial Dead Load** = 300.0 lbs
- **Axial Live Load** = 250.0 lbs
- **Axial Load Eccentricity** = 1.0 in

### Design Summary

<table>
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<tr>
<th>Wall Stability Ratios</th>
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<tr>
<td>Sliding</td>
<td>4.24 OK</td>
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</table>

**Slab Resists All Sliding**

| Total Bearing Load     | 1,219 lbs |
|                        | 4.30 in |

| Soil Pressure @ Toe    | 2,074 psf OK |
|                        | 0 psf OK |

**Allowable** = 2,500 psf

**Soil Pressure Less Than Allowable**

| ACI Factored @ Toe     | 2,659 psf |
|                        | 0 psf |

| Footing Shear @ Toe    | 0.0 psi OK |
|                        | 0.8 psi OK |

**Allowable** = 75.5 psi

**Sliding Calc** Slab Resists All Sliding

| Lateral Sliding Force  | 120.2 lbs |
|                        | 170.1 lbs |
| less 100% Passive Force | 396 lbs |

| Added Force Req'd      | 0.0 lbs OK |
|                        | 0.0 lbs OK |

| for 1.5 : 1 Stability  | 1.000 |

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<thead>
<tr>
<th>Stem Construction</th>
<th>Top Stem</th>
<th>2nd Stem</th>
<th>3rd Stem</th>
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<td>18.00</td>
<td>18.00</td>
<td>18.00</td>
</tr>
<tr>
<td><strong>Rebar Placed at</strong></td>
<td>Center</td>
<td>Center</td>
<td>Center</td>
</tr>
</tbody>
</table>

| **Design Data**         | 0.069    | 0.163    | 0.167    |
| **Total Force @ Section** | 2.0      | 88.4     | 98.6     |
| **Moment...Actual**     | 63.6     | 238.5    | 363.0    |
| **Moment...Allowable**  | 2,305.6  | 2,305.6  | 2,305.6  |
| **Shear...Actual**      | 0.0      | 2.7      | 2.9      |
| **Shear...Allowable**   | 30.5     | 30.5     | 30.5     |
| **Wall Weight**         | 100.0    | 100.0    | 100.0    |
| **Rebar Depth 'd'**     | 4.00     | 4.00     | 4.00     |
| **Lap splice at**       | 12.00    | 12.00    | 12.00    |
| **Lap splice at below** | 12.00    | 12.00    | 3.60     |
| **Hook embed into footing** | 12.00 | 12.00 | 3.60 |

| **Concrete Data**       | 2,500.0  | 2,500.0  | 2,500.0  |
| **Fy**                 | 60,000.0 | 60,000.0 | 60,000.0 |

| Load Factors |  |  |  |
|---------------|  |  |  |
| Dead Load     | 1.200 |
| Live Load     | 1.600 |
| Earth, H      | 1.600 |
| Wind, W       | 1.600 |
| Seismic, E    | 1.000 |
Cantilevered Retaining Wall

Footing Dimensions & Strengths

- Toe Width = 0.42 ft
- Heel Width = 1.08 ft
- Total Footing Width = 1.50 ft
- Footing Thickness = 12.00 in
- Key Width = 1.00 in
- Key Depth = 0.00 in
- Key Distance from Toe = 0.00 ft
- $f_c = 2,500$ psi
- $f_y = 60,000$ psi
- Footing Concrete Density = 150.00pcf
- Min. As % = 0.008
- Cover @ Top = 2.00 in @ Btm. = 3.00 in

Footing Design Results

- Toe
  - Factored Pressure = 2,659 psi
  - Mu' : Upward = 204 ft-lb
  - Mu' : Downward = 18 ft-lb
  - Mu: Design = 186 ft-lb
  - Actual 1-Way Shear = 0.78 psi
  - Allow 1-Way Shear = 75.00 psi
  - Toe Reinforcing = #4 @ 18.00 in
  - Heel Reinforcing = #4 @ 18.00 in
  - Key Reinforcing = None Spec'd

- Heel

Other Acceptable Sizes & Spacings

- Toe: Not req'd, Mu < S * Fr
- Heel: Not req'd, Mu < S * Fr
- Key: Slat Resists Sliding - No Force on Key

Summary of Overturning & Resisting Forces & Moments

<table>
<thead>
<tr>
<th>Item</th>
<th>Force</th>
<th>Distance</th>
<th>Moment</th>
<th>Force</th>
<th>Distance</th>
<th>Moment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heel Active Pressure</td>
<td>35.2</td>
<td>0.42</td>
<td>14.6</td>
<td>Soil Over Heel</td>
<td>11.5</td>
<td>1.29</td>
</tr>
<tr>
<td>Surcharge over Heel</td>
<td></td>
<td></td>
<td></td>
<td>Sloped Soil Over Heel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toe Active Pressure</td>
<td></td>
<td></td>
<td></td>
<td>Surcharge Over Heel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surcharge Over Toe</td>
<td></td>
<td></td>
<td></td>
<td>Adjacent Footing Load</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjacent Footing Load</td>
<td></td>
<td></td>
<td></td>
<td>Axial Dead Load on Stem</td>
<td>300.0</td>
<td>0.67</td>
</tr>
<tr>
<td>Added Lateral Load</td>
<td>65.0</td>
<td>4.50</td>
<td>292.5</td>
<td>Axial Live Load on Stem</td>
<td>250.0</td>
<td>0.67</td>
</tr>
<tr>
<td>Load @ Stem Above Soil</td>
<td>20.0</td>
<td>3.25</td>
<td>65.0</td>
<td>Soil Over Toe</td>
<td>7.6</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Surcharge Over Toe</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Stem Weight(s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Earth @ Stem Transitions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Footing Weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Key Weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Vert. Component</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>120.2</td>
<td>O.T.M.  =</td>
<td>372.1</td>
<td>Total</td>
<td>969.2 lbs</td>
<td>R.M.  =</td>
</tr>
</tbody>
</table>

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.
<table>
<thead>
<tr>
<th>STEEL STUD</th>
<th>16 ga.</th>
<th>18 ga.</th>
<th>20 ga.</th>
<th>22 ga.</th>
<th>24 ga.</th>
<th>26 ga.</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.0 x 12.0'</td>
<td>34.00</td>
<td>32.00</td>
<td>30.00</td>
<td>28.00</td>
<td>26.00</td>
<td>24.00</td>
</tr>
<tr>
<td>18.0 x 24.0'</td>
<td>36.00</td>
<td>34.00</td>
<td>32.00</td>
<td>30.00</td>
<td>28.00</td>
<td>26.00</td>
</tr>
<tr>
<td>18.0 x 36.0'</td>
<td>38.00</td>
<td>36.00</td>
<td>34.00</td>
<td>32.00</td>
<td>30.00</td>
<td>28.00</td>
</tr>
<tr>
<td>18.0 x 48.0'</td>
<td>40.00</td>
<td>38.00</td>
<td>36.00</td>
<td>34.00</td>
<td>32.00</td>
<td>30.00</td>
</tr>
</tbody>
</table>

**Limiting Wall Heights – Curtain Wall**

- **Height of Steel Stud**: 16 ga. - 24.0', 18 ga. - 26.0', 20 ga. - 28.0', 22 ga. - 30.0', 24 ga. - 32.0', 26 ga. - 34.0'
- **Use 550S162-43 @ 24" OC**

---

"F" denotes stress controlled section, all other sections are deflection controlled

See page 16 for Wall Height Table Notes
### IBC 2015 1609.6 Alternate All-Heights Wind

**Lic. #:** KW-06001594  
**Description:** Alternate

#### Analytical Values

**User verified these IBC 2015 All-Heights Wind Method Limitations:**

- **1609.6.1 (1):** Total Height <= 75 ft with (Height/Least Width) <= 4 or Fundamental frequency >= 1 hertz
- **1609.6.1 (2):** Not sensitive to dynamic effects
- **1609.6.1 (3):** Site not affected by channeling/buffeting from upwind items
- **1609.6.1 (4):** Simple diaphragm building per ASCE 7-10 Sec 26.2
- **1609.6.1 (5):** Aware of ASCE 7 provisions for open buildings, multispans gable roofs, stepped roofs, sawtooth roofs, domed roofs, roofs with slopes > 45 deg, solid free standing walls & signs.
- **1609.6.4.1:** Aware of need to check torsion per ASCE 7 Fig. 27.4-8

**MWFRS Table per IBC 2015 1609.6.2, Section 1**

#### WINDWARD WALLS & PARAPETS

<table>
<thead>
<tr>
<th>Height</th>
<th>Kz</th>
<th>Enclosed +Internal</th>
<th>Partially Enclosed +Internal</th>
<th>Enclosed -Internal</th>
<th>Partially Enclosed -Internal</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 15'</td>
<td>0.850</td>
<td>19.39</td>
<td>4.96</td>
<td>32.92</td>
<td>47.34</td>
</tr>
<tr>
<td>20'</td>
<td>0.900</td>
<td>20.53</td>
<td>5.25</td>
<td>34.85</td>
<td>50.13</td>
</tr>
<tr>
<td>25'</td>
<td>0.940</td>
<td>21.44</td>
<td>5.49</td>
<td>36.40</td>
<td>52.36</td>
</tr>
<tr>
<td>30'</td>
<td>0.980</td>
<td>22.35</td>
<td>5.72</td>
<td>37.95</td>
<td>54.59</td>
</tr>
<tr>
<td>40'</td>
<td>1.040</td>
<td>23.72</td>
<td>6.07</td>
<td>40.27</td>
<td>57.93</td>
</tr>
<tr>
<td>50'</td>
<td>1.090</td>
<td>24.86</td>
<td>6.36</td>
<td>42.21</td>
<td>60.71</td>
</tr>
<tr>
<td>60'</td>
<td>1.130</td>
<td>25.78</td>
<td>6.59</td>
<td>43.76</td>
<td>62.94</td>
</tr>
<tr>
<td>70'</td>
<td>1.170</td>
<td>26.69</td>
<td>6.83</td>
<td>45.31</td>
<td>65.17</td>
</tr>
<tr>
<td>80'</td>
<td>1.210</td>
<td>27.60</td>
<td>7.10</td>
<td>46.86</td>
<td>67.40</td>
</tr>
<tr>
<td>90'</td>
<td>1.240</td>
<td>28.28</td>
<td>7.24</td>
<td>48.02</td>
<td>69.07</td>
</tr>
<tr>
<td>100'</td>
<td>1.260</td>
<td>28.74</td>
<td>7.35</td>
<td>48.79</td>
<td>70.18</td>
</tr>
</tbody>
</table>

#### LEEWARD & SIDEWALLS

<table>
<thead>
<tr>
<th>Kz based on IBC 2015 1609.6.4.2 Item 2</th>
<th>Enclosed +Internal</th>
<th>Partially Enclosed +Internal</th>
<th>Enclosed -Internal</th>
<th>Partially Enclosed -Internal</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.928</td>
<td>25.11</td>
<td>-40.34</td>
<td>5.42</td>
<td></td>
</tr>
</tbody>
</table>

- **Leeward Wall**
- **Side Wall**
- **Parapet Wall:** Leeward

**Design Pressure** $P = 0.00256 \cdot V^{2} \cdot K \cdot C \cdot K_{z}^{net} \cdot K_{zt}$

---

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**IBC 2015 1609.6 Alternate All-Heights Wind**

*Description: Alternate*

**MWFRS per IBC 2015  Table 1609.6.2  Section 1**

Kz per IBC 2015 1609.6.4.2 Item 2 = 0.928

**WIND PERPENDICULAR TO RIDGE**

- **Enclosed**
  - Leeward Roof or Flat Roof
    - +Internal
      - Slope < 2:12 (10 deg): -32.49
      - Slope < 4:12 (18 deg): -35.94
      - Slope < 5:12 (23 deg): -28.55
      - Slope < 6:12 (27 deg): -23.14
      - Slope < 7:12 (30 deg): -18.21
      - Slope < 9:12 (37 deg): -13.29
      - Slope < 12:12 (45 deg): 6.89
    - -Internal
      - Slope < 2:12 (10 deg): -17.23
      - Slope < 4:12 (18 deg): -20.68
      - Slope < 5:12 (23 deg): -13.78
      - Slope < 6:12 (27 deg): -7.88
      - Slope < 7:12 (30 deg): -2.95
      - Slope < 9:12 (37 deg): 1.97
      - Slope < 12:12 (45 deg): 21.66
  - Windward Roof Slopes
    - Condition 1
      - Slope < 2:12 (10 deg): -63.66
      - Slope < 4:12 (18 deg): -35.94
      - Slope < 5:12 (23 deg): -28.55
      - Slope < 6:12 (27 deg): -23.14
      - Slope < 7:12 (30 deg): -18.21
      - Slope < 9:12 (37 deg): 1.48
      - Slope < 12:12 (45 deg): 6.89
    - Condition 2
      - Slope < 2:12 (10 deg): -13.78
      - Slope < 4:12 (18 deg): -12.31
      - Slope < 5:12 (23 deg): 1.48
      - Slope < 6:12 (27 deg): 2.95
      - Slope < 7:12 (30 deg): 3.45
      - Slope < 12:12 (45 deg): 21.66

**Partially Enclosed**

- +Internal
  - Slope < 2:12 (10 deg): -47.75
  - Slope < 4:12 (18 deg): -51.20
  - Slope < 5:12 (23 deg): -44.30
  - Slope < 6:12 (27 deg): -38.40
  - Slope < 7:12 (30 deg): -33.47
  - Slope < 9:12 (37 deg): -28.65
  - Slope < 12:12 (45 deg): 6.89
- -Internal
  - Slope < 2:12 (10 deg): -1.97
  - Slope < 4:12 (18 deg): 1.97
  - Slope < 5:12 (23 deg): 1.97
  - Slope < 6:12 (27 deg): 7.38
  - Slope < 7:12 (30 deg): 33.47
  - Slope < 9:12 (37 deg): 17.23
  - Slope < 12:12 (45 deg): 37.41

**WIND PARALLEL TO RIDGE**

- All slopes including Flat Roofs: 53.66

**Roof & Overhang Components & Cladding per IBC 2015  Table 1609.6.2,  Section 2 & 3**

**Design Pressure** \( P = 0.00256 \) \( V^2 \) \( K_z \) \( C_z \) \( K_{zt} \) psf

<table>
<thead>
<tr>
<th>Description</th>
<th>Continuity</th>
<th>Item Type</th>
<th>Eff. Area ft²</th>
<th>Kz</th>
<th>Enclosed</th>
<th>Partially Enclosed</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Discontinuity</td>
<td>Gable, Slope &lt; 6:12</td>
<td>10.00</td>
<td>0.928</td>
<td>+/- 0.00</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

**Wall & Parapet Components & Cladding per IBC 2015  Table 1609.6.2,  Section 4 & 5**

**Design Pressure** \( P = 0.00256 \) \( V^2 \) \( K_z \) \( C_z \) \( K_{zt} \) psf

<table>
<thead>
<tr>
<th>Description</th>
<th>Continuity</th>
<th>Item Type</th>
<th>Z, Ht. Above Ground Level, ft</th>
<th>Eff. Area ft²</th>
<th>Kz</th>
<th>Enclosed</th>
<th>Partially Enclosed</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Discontinuity</td>
<td>Wall Elements, h=&lt;60 ft</td>
<td>25</td>
<td>10.00</td>
<td>0.94</td>
<td>+/- 49.86</td>
<td>65.82</td>
<td></td>
</tr>
</tbody>
</table>

| | | | +/- | +54.35 | -69.81 |
Non essential
Risk Category

Risk Category of Building or Other Structure: "II": All Buildings and other structures except those listed as Category I, III, and IV

Seismic Importance Factor = 1

Gridded Ss & S1 values ASCE-7-10 Standard

Max. Ground Motions, 5% Damping:

<table>
<thead>
<tr>
<th>Ss</th>
<th>0.2942 g, 0.2 sec response</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>0.1047 g, 1.0 sec response</td>
</tr>
</tbody>
</table>

Latitude = 43.319 deg North
Longitude = 113.945 deg West

Site Class, Site Coeff. and Design Category

Site Classification "D": Shear Wave Velocity 600 to 1,200 ft/sec = D

Site Coefficients Fa & Fv

- Fa = 1.56
- Fv = 2.38

Maximum Considered Earthquake Acceleration

\[ S_{MS} = F_a \times S_s = 0.460 \]
\[ S_{M1} = F_v \times S_1 = 0.249 \]

Design Spectral Acceleration

\[ S_{DS} = S_{MS}^{2/3} = 0.307 \]
\[ S_{DI} = S_{M1}^{2/3} = 0.166 \]

Seismic Design Category = C

Resisting System

Basic Seismic Force Resisting System . . .

<table>
<thead>
<tr>
<th>Response Modification Coefficient &quot;R&quot;</th>
<th>3.50</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Overstrength Factor &quot;Wo&quot;</td>
<td>2.50</td>
</tr>
<tr>
<td>Deflection Amplification Factor &quot;Cd&quot;</td>
<td>2.25</td>
</tr>
</tbody>
</table>

Building height Limits:

- Category "A & B" Limit: No Limit
- Category "C" Limit: No Limit
- Category "D" Limit: Not Permitted
- Category "E" Limit: Not Permitted
- Category "F" Limit: Not Permitted

NOTE: See ASCE 7-10 for all applicable footnotes.

Lateral Force Procedure

Equivalent Lateral Force Procedure

The "Equivalent Lateral Force Procedure" is being used according to the provisions of ASCE 7-10 12.8

Determine Building Period

Use ASCE 12.8-7

Structure Type for Building Period Calculation:

- All Other Structural Systems

* Ct * value = 0.020
* x value = 0.75
* Ta * Approximate fundamental period using Eq. 12.8-7:

\[ Ta = Ct \times (h_n \times x) = 0.263 \text{ sec} \]

"TL": Long-period transition period per ASCE 7-10 Maps 22-12 -> 22-16

\[ 6.000 \text{ sec} \]

Building Period * Ta * Calculated from Approximate Method selected = 0.263 sec

"Cs" Response Coefficient

<table>
<thead>
<tr>
<th>S_{DS}</th>
<th>0.307 From Eq. 12.8-2, Preliminary Cs</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>3.50 From Eq. 12.8-3 &amp; 12.8-4, Cs need not exceed</td>
</tr>
<tr>
<td>I</td>
<td>1 From Eq. 12.8-5 &amp; 12.8-6, Cs not be less than</td>
</tr>
</tbody>
</table>

Cs : Seismic Response Coefficient = 0.0877

Seismic Base Shear

\[ Cs = 0.0877 \text{ from 12.8.1.1} \]

W (see Sum WI below) = 1.00 k

Seismic Base Shear \[ V = Cs \times W = 0.09 k \]
**Vertical Distribution of Seismic Forces**

*Note:* Use x exponent based on $\frac{T_a}{T} = 1.00$

<table>
<thead>
<tr>
<th>Level #</th>
<th>$W_i$</th>
<th>$H_i$</th>
<th>$(W_i * H_i)^{1.00}$</th>
<th>$C_v$</th>
<th>$F_{x,v} * v$</th>
<th>SUM Story Shear</th>
<th>SUM Story Moment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.00</td>
<td>16.00</td>
<td>16.00</td>
<td>1.0000</td>
<td>0.09</td>
<td>0.09</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table of building Weights by Floor Level...

**Diaphragm Forces : Seismic Design Category "B" to "F"**

- $W_{px}$: Weight at level of diaphragm and other structure elements attached to it.
- $F_L$: Design Lateral Force applied at the level.
- $\sum F_{i}$: Sum of "Lat. Force" of current level plus all levels above

<table>
<thead>
<tr>
<th>Level #</th>
<th>$W_i$</th>
<th>$F_L$</th>
<th>$\sum F_{i}$</th>
<th>$\sum W_i$</th>
<th>$F_{px, Calcd}$</th>
<th>$F_{px, Min}$</th>
<th>$F_{px, Max}$</th>
<th>$F_{px}$</th>
<th>Dsgn. Force</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.00</td>
<td>0.09</td>
<td>0.09</td>
<td>1.00</td>
<td>0.09</td>
<td>0.09</td>
<td>0.12</td>
<td>0.09</td>
<td>0.09</td>
</tr>
</tbody>
</table>

MIN Req'd Force @ Level .............. $0.20 * S_{d,x} l * W_{px}$
MAX Req'd Force @ Level .............. $0.40 * S_{d,x} l * W_{px}$

$F_{px}$: Design Force @ Level ........ $W_{px} * SUM(x->n) F_L / SUM(x->n) w_i$, $x =$ Current level, $n =$ Top Level
**LATERAL ANALYSIS CONT'D**

**Removal of Rear Wall and Addition of New Rear Wall 12' out will affect lateral load distribution.**

**Seismic**

\[ W = \text{dead load} + 35\% \text{ of roof snow} \]

\[ V = C_s \cdot W = 0.88 \cdot W \]

**Roof**

\[ W_{\text{exist.}} = \left[ 44 + 2(1.5) \left] \right. \left[ 114.7 + 2(2) \right] \left( 16.5 + 0.35(50) \right) \]

\[ = (50)(118.7)(34 \text{ psf}) = 201,790 \text{#} \]

\[ W_{\text{addn.}} = (12') (102.8 + 2(1.5))(17.0 + 0.35(50)) \]

\[ = 12(34.5 \text{ psf}) = 44,229 \text{#} \]

\[ W_{\text{total}} = 246,019 \text{#} \]

**Walls**

- **cmu**
  - 35 psf (14'/2) = 100 plf
- **concrete**
  - 10 psf (6'/2) = 30 plf

**Line Forces**

<table>
<thead>
<tr>
<th>Line</th>
<th>Force</th>
<th>Walls, cmu</th>
</tr>
</thead>
</table>
| 1    | \[ V_1 = 0.88 \left[ \frac{44 \cdot 229}{6} + \frac{44}{2} (201.790) + 100 \cdot 50 (28.5) \right] = \]
|      | .088 \left[ 44 \cdot 229 + 73,378 + 3690 \right] \approx 0.88 \left[ 121,247 \right] | = \frac{10,610}{100} \text{#} |
| 2    | \[ V_2 = 0 - \text{wall removed} \] | N.A. |
| 3    | \[ V_3 = 0.88 \left[ 22(144) (201.790) + 130 (2.3) \right] = \]
|      | .088 \left[ 128,412 \right] = 11,333 \text{#} | |
| A    | \[ V_{\text{addn.}} = 0.88 \left[ \frac{201.790 + 44 \cdot 229}{2} + 100 (114.2) \right] \]
|      | .088 \left[ 257,419 \right] \sqrt{2} = 11,326 \text{#} | = \frac{21,020}{100} \text{#} |

**Notes:**

- \[ l_1 = 12.8 - 4(4.7) \]
- \[ l_2 = 4.5 + 3.8 + 2.7 + 4(4.4) = 27\]
LATERAL CONT'D

WIND ENCLOSED AT STORM EVENT

ROOF
N-S (L TO RIDGE) 19.2 PSF
E-W (N TO RIDGE) 53.7 PSF
WALLS 26.1 PSF

LINE FORCES

1. \( V = 26.1 \text{ PSF} \left[ (23' \times 7) + 28' (12') \right] = \)
2. \( = 26.1 \times (196 + 168) = 9500 \text{ #} \)
3. \( A. V = 26.1 \text{ PSF} (114.7' \times 7') + 19.2 (114.7' \times 12') = \)
D. \( = 20950 + 24,427 = \frac{45,377}{1.4} \text{ ASO} \)

SEISMIC GOVERNS EW
WIND GOVERNS N S

Use 8" CMU WALLS W/ 1
# 5 @ 48" oc. VERTICAL
1 (2)# 5 @ 48" oc. HORIZONTAL

AHJ NO. 18034
PROJECT 1 TD CARLEY

DATE: 4/25/13
BY: DH

AHJ ENGINEERS, PC
STRUCTURAL CONSULTANTS

SHEET NO.
# Masonry Shear Wall

**Material:** CMU  
**Type:** Grid 1  
**Seismic Design Category:** C  
**Seismic Force Resisting System:** Intermediate Reinforced Masonry Shear Walls

---

### Wall Details

<table>
<thead>
<tr>
<th>Pier no.</th>
<th>Wall Thickness (in)</th>
<th>Vertical Bar Size (#)</th>
<th>Vertical Bar Spacing (in)</th>
<th>End Conditions</th>
<th>MVd</th>
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<tbody>
<tr>
<td>no. 1</td>
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<td>48</td>
<td>Fix-Free</td>
<td></td>
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</table>

### Horizontal Steel

- **Wind shear at ea pier (lbs):** 8872.3, 527.7  
- **Fv, wind (PSI):** 2.98, 1.56  
- **Bending Steel, Wind (in$^2$):** 0.03, 0.02  
- **Wind dead load (in$^2$):** 0.0006, 0.0005

### Seismic Details

- **Seismic shear at ea pier (lbs):** 9964.9, 705.1  
- **Fv, seismic (PSI):** 3.35, 1.75  
- **Bending Steel, Seismic (in$^2$):** 0.036, 0.021  
- **Seismic dead load (in$^2$):** 0.0007, 0.0005

### Summary:

- **Fv, max:** 3.35, 1.75  
- **Fv:** 74.10, 52.62  
- **Fv, special reinforced:** 37.05, 23.31  
- **Fv, with horizontal rein:** 74.10, 52.62  
- **Fv, with horizontal rein:** 116.19, 91.25  
- **Horiz shear Av required (in/ft):** 0.04, 0.02

---

\[ < (2) > \]
### Masonry Shear Wall

**Mark:** Grid 3

- $P_{\text{wind}}$: 9500 lbs. ASD
- $P_{\text{seismic}}$: 11300 lbs. ASD
- $f_m$: 1500 psi
- Material Type: CMU
  - $E_m$: 1350000
  - $F_y$: 60000
  - $f_{fs}$: 32000
- Seismic Design Category: C
- Seismic Force Resisting System: Intermediate Reinforced Masonry Shear Walls

**Dimensions:**

<table>
<thead>
<tr>
<th>Pier No.</th>
<th>Wall Thickness</th>
<th>Wall Height</th>
<th>Vertical Bar Size</th>
<th>Vertical Bar Spacing</th>
<th>End Conditions</th>
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<tr>
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<td>48</td>
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</table>

**M/Vd:**

- 3.50
- 3.68
- 5.19
- 3.50
- 3.68
- 3.50

**Wind shear at pier (lbs):**

- 1558.9
- 1316.8
- 388.6
- 1558.9
- 1558.9
- 1558.9
- 1558.9
- 1558.9
- 1558.9

**Bending Steel steel (in²):**

- 0.26
- 0.24
- 0.12
- 0.26
- 0.26
- 0.26
- 0.26
- 0.26
- 0.26
- 0.26

**Seismic shear at pier (lbs):**

- 1854.3
- 1566.3
- 462.2
- 1854.3
- 1854.3
- 1854.3
- 1854.3
- 1854.3
- 1854.3

**Summary:**

- $f_{\text{ray}}$: 13.16
- $f_{\text{ray}}$: 11.61
- $f_{\text{ray}}$: 4.54
- $f_{\text{ray}}$: 13.16
- $f_{\text{ray}}$: 13.16
- $f_{\text{ray}}$: 13.16
- $f_{\text{ray}}$: 13.16
- $f_{\text{ray}}$: 13.16
- $f_{\text{ray}}$: 13.16

**Special Reinforced Masonry - P佤:**

- 21.79
- 21.79
- 21.79
- 21.79
- 21.79
- 21.79
- 21.79
- 21.79
- 21.79

**Bending Steel required:**

- 0.31
- 0.28
- 0.14
- 0.31
- 0.31
- 0.31
- 0.31
## Masonry Shear Wall

<table>
<thead>
<tr>
<th>Wall No.</th>
<th>Pier No.1</th>
<th>Pier No.2</th>
<th>Pier No.3</th>
<th>Pier No.4</th>
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<td>#5</td>
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<td>Vertical Bar Spacing</td>
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<td>Fix-Free</td>
<td>Fix-Fix</td>
<td>Fix-Fix</td>
<td>Fix-Fix</td>
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<td>Fix-Fix</td>
<td>Fix-Fix</td>
<td>Fix-Fix</td>
<td>Fix-Fix</td>
<td>Fix-Fix</td>
</tr>
</tbody>
</table>

### Wind Load

- Wind sheat at each pier (lbs) = 32265.1
- \( f_v \) wind (PSI) = 22.88
- Bending Steel Wind (in^2) = 0.47
- \( f_{vdre} \) wind (in^2) = 0.0103

### Seismic Load

- Seismic sheat at each pier (lbs) = 11273.3
- \( f_v \) seismic (PSI) = 7.92
- Bending Steel Seismic (in^2) = 0.165
- Seismic Bending (in^2) = 0.0036

### Summary

- \( N_{M} \) = 22.68
- \( M_{M} \) = 64.21
- Special Reinforced Masonry - \( F_{M} \) = 32.10
- \( V_{W}, \) horizontal req'd = 64.21
- \( V_{W}, \) horizontal req'd = 108.91
- Horiz shear Av required in/ft: no horiz
- Bending Steel required: 0.47

\[ \angle (2) \#5 = 62 \text{ in}^2 \]
**Foundation Analysis**

\( q = 1500 \text{ psf (assumed)} \)

Actually 2500 psf from Boring Log.

<table>
<thead>
<tr>
<th>New Rear Wall</th>
</tr>
</thead>
<tbody>
<tr>
<td>( W_{DL} = 17 \cdot \frac{12}{2} + 2 + 94 \cdot 7 + 100 \cdot 2 = 1094 \text{ PLF} )</td>
</tr>
<tr>
<td>( W_{SW} = 50 \text{ psf (3)} )</td>
</tr>
<tr>
<td>( W = \frac{1494}{1500} = .99' \Rightarrow 1'6'' \text{ min} )</td>
</tr>
</tbody>
</table>

**Use** 1'-6'' wide x 10'' thick FG

AHJ NO. 18034  
PROJECT LTD CAREY  
DATE:  
BY: D14  
SHEET NO. 57
General Footing
Lic. #: KW-06001594

Description: Footing at max column load

Code References
Calculations per ACI 318-14, IBC 2015, CBC 2016, ASCE 7-10
Load Combinations Used: ASCE 7-10

General Information

Material Properties
- $f_c$: Concrete 28 day strength = 3.0 ksi
- $f_y$: Rebar Yield = 60.0 ksi
- $E_c$: Concrete Elastic Modulus = 3,122.0 ksi
- Concrete Density = 145.0pcf
- $q_p$ Values
  - Flexure = 0.90
  - Shear = 0.750

Analysis Settings
- Min Steel % Bending Reinf. =
- Min Allow % Temp Reinf. = 0.00050
- Min. Overturning Safety Factor = 1.50:1
- Min. Sliding Safety Factor = 1.50:1
- Add Ftg Wt for Soil Pressure = Yes
- Use ftg wt for stability, moments & shears = Yes
- Add Pedestal Wt for Soil Pressure = No
- Use Pedestal Wt for stability, mom & shear = No

Dimensions
- Width parallel to X-X Axis = 3.34 ft
- Length parallel to Z-Z Axis = 9.0 ft
- Footing Thickness = 10.50 in
- Load location offset from footing center...
  - ex: Prt to X-X Axis = 4 in
  - = in

Pedestal dimensions...
- $p_x$: parallel to X-X Axis = 16.0 in
- $p_z$: parallel to Z-Z Axis = 96.0 in
- Height = 36.0 in
- Rebar Centerline to Edge of Concrete...
  - at Bottom of footing = 3.0 in

Reinforcing

Bars parallel to X-X Axis
- Number of Bars = 5
- Reinforcing Bar Size = # 4

Bars parallel to Z-Z Axis
- Number of Bars = 3
- Reinforcing Bar Size = # 4

Bandwidth Distribution Check (ACI 15.4.4.2)
- Direction Requiring Closer Separation:
  - $X-X$ Axis
- # Bars required within zone = 54.1 %
- # Bars required on each side of zone = 45.9 %

Applied Loads

<table>
<thead>
<tr>
<th></th>
<th>D</th>
<th>Lr</th>
<th>L</th>
<th>S</th>
<th>W</th>
<th>E</th>
<th>H</th>
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</thead>
<tbody>
<tr>
<td>P: Column Load</td>
<td>16.220</td>
<td>0.0</td>
<td>6.0</td>
<td>24.160</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0 k</td>
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<td>OB: Overburden</td>
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<td>0.0 ksf</td>
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<td>M-xx</td>
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<td>0.0 k-ft</td>
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<td>V-x</td>
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<td>0.0</td>
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<td>0.0 k</td>
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## General Footing

### Design Summary

<table>
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<tr>
<th>Item</th>
<th>Applied</th>
<th>Capacity</th>
<th>Governing Load Combination</th>
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</thead>
<tbody>
<tr>
<td>Soil Bearing</td>
<td>2.388 ksf</td>
<td>2.50 ksf</td>
<td>+0+S about Z-Z axis</td>
</tr>
<tr>
<td>Overturining - X-X</td>
<td>0.0 k-ft</td>
<td>0.0 k-ft</td>
<td>No Overturining</td>
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<tr>
<td>Overturining - Z-Z</td>
<td>0.0 k-ft</td>
<td>0.0 k-ft</td>
<td>No Overturining</td>
</tr>
<tr>
<td>Sliding - X-X</td>
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<td>0.0 k</td>
<td>No Sliding</td>
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<tr>
<td>Sliding - Z-Z</td>
<td>0.0 k</td>
<td>0.0 k</td>
<td>No Sliding</td>
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<td>Uplift</td>
<td>0.0 k</td>
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<td>No Uplift</td>
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<td>Z Flexure (+X)</td>
<td>6.59 k-ft/t</td>
<td>3.69 k-ft/t</td>
<td>+1.20+0.50L+1.60S</td>
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<tr>
<td>X Flexure (+X)</td>
<td>0.96 k-ft/t</td>
<td>3.69 k-ft/t</td>
<td>+1.20+0.50L+1.60S</td>
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<tr>
<td>X Flexure (+Z)</td>
<td>5.92 k-ft/t</td>
<td>5.92 k-ft/t</td>
<td>+1.20+0.50L+1.60S</td>
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<tr>
<td>1-way Shear (+X)</td>
<td>1.14 kpsi</td>
<td>82.15 kpsi</td>
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### Detailed Results

#### Soil Bearing

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<tr>
<th>Rotation Axis &amp; Load Combination...</th>
<th>Gross Allowable</th>
<th>Xecc (in)</th>
<th>Z ecc (in)</th>
<th>Actual Soil Bearing Stress @ Location</th>
<th>Actual / Allow Ratio</th>
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</thead>
<tbody>
<tr>
<td>X-X, D Only</td>
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<td>0.8173</td>
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<td>X-X, +D+L</td>
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<td>n/a</td>
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<td>X-X, +0.60D</td>
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<td>Z-Z, D Only</td>
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<td>Z-Z, +D+L</td>
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#### Overturning Stability

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#### Sliding Stability

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#### Footing Flexure

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<th>Actual As</th>
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SECTION 01100 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Access to site.
5. Coordination with occupants.
6. Work restrictions.
7. Specification and drawing conventions.

B. Related Requirements:

1. Section 01500 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION


1. Project Location: Carey, Idaho.

B. Owner: Idaho Transportation Department, P.O. Box 7129, Boise, Idaho.

1. Owner's Representative: To be determined after Award of Bid.


D. Design Professional's Consultants: The Design Professional has retained the following design professionals who have prepared designated portions of the Contract Documents:

2. Electrical Engineer: Bradley Engineering, 645 W 25th Street, Idaho Falls, Idaho 83402. Contact: Matt Bradley
1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. The scope of the work consists of construction of a 12’ x 103’-4” addition, slab on grade, CMU wall, wood framed roof and structural steel beam line to support existing roof structure. See Section 01230 Alternates for additional required work.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.5 PHASED CONSTRUCTION

A. The Work shall be conducted in one Phase.

1.6 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations

B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits: Confine construction operations to areas in the immediate vicinity of areas to be remodeled.

2. Driveways, Walkways and Entrances: Keep driveways, parking areas, loading areas and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

a. Schedule deliveries to minimize use of driveways and entrances by construction operations.

b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight and secure condition throughout construction period. Repair damage caused by construction operations.

1.7 COORDINATION WITH OCCUPANTS

A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.

2. Provide not less three business days' notice to Owner and Design Professional of activities that will affect Owner's operations.

1.8 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:00 a.m. to 4:00 p.m. (MDT), Monday through Friday, unless otherwise indicated.

1. Weekend Hours: When approved in advance by Owner.
2. Early Morning Hours: When approved in advance by Owner.
3. Hours for Utility Shutdowns: When approved in advance by Owner.
4. Hours for core drilling, saw cutting, hammer drilling and other noisy activities: Between 7:00 a.m. and 5:00 p.m.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Design Professional and Owner not less than three working days in advance of proposed utility interruptions.
2. Obtain Design Professional's and Owner's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Design Professional and Owner not less than three working days in advance of proposed disruptive operations.
2. Obtain Design Professional's and Owner's written permission before proceeding with disruptive operations.

E. Nonsmoking Building: Smoking is not permitted within the building or within 50 feet of the entry door.

F. Controlled Substances: Use of controlled substances within the existing building or on campus is not permitted.
1.9 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01100
SECTION 01230 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Execute accepted alternates under the same conditions as other work of the Contract.

C. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)
PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Additional S.O.G.
   1. Base Bid: Saw cut and remove concrete around the existing sand and sediment trap in Bay 3 and Bay 4 as indicated on drawings.
   2. Add Alternate No. 1 (Additional SOG): Remove the sand and sediment trap and a portion of existing concrete floor slab in Bay 4 and a portion of Bay 3 as shown on Sheet A2.2. Provide new 6” concrete slab and reinforcing along with a new drain with associated piping per plumbing drawings.

B. Add Alternate No. 2: Hardware:
   1. Base Bid: No work to existing doors E3, E4, E5, and E6.
   2. Add Alternate No. 2 (Hardware Door Re-finish): Remove existing door hardware repair, sand prep for new finish of existing doors E3, E4, E5 and E6. Provide new hardware per specification, stain and varnish per specification.

C. Add Alternate No. 3: Paint:
   1. Base Bid: Office new windows, window sills, split HVAC system, light fixtures and associated painting where shown on drawings.
   2. Add Alternate No. 3: (Paints): Clean prep and paint all walls and ceiling, per specification.

D. Add Alternate No. 4: Finishes:
   1. Base Bid: Office new windows, window sills, split HVAC system, light fixtures and associated painting where shown on drawings.
   2. Add Alternate No. 4 (Finishes): Remove existing VCT flooring, clean prep and provide new resilient linoleum per specification.

E. Add Alternate No. 5: Paint:
   2. Add Alternate No. 5 (Paint): Clean and prep wall and ceiling. Paint all walls and ceiling per specification.

F. Add Alternate No. 6: Paint:
   2. Add Alternate No. 6 (Paint): Clean prep existing concrete floor. Provide new epoxy floor finish per specification.

G. Add Alternate No. 7: Finishes:
   2. Add Alternate No. 7 (Finishes): Remove existing toilet fixtures and exhaust fan. Provide new fixtures and exhaust fan per plumbing drawings and specifications.

H. Add Alternate No. 8: Exterior Painting:
   1. Base Bid: No work at existing exterior CMU walls and metal wall panel siding.
   2. Add Alternate No. 8 (Exterior Painting): Clean existing exterior CMU and metal wall panel prep for new finish. Paint existing exterior CMU walls and metal wall panels.

END OF SECTION 01230
SECTION 01250 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

B. Related Sections include the following:

    1. Division 1 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Design Professional will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Design Professional will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

    1. Proposal Requests issued by Design Professional are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
    2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

        a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
        b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
        c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, 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.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Design Professional.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, 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.
6. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal, Design Professional will issue a Change Order for signatures of Owner and Contractor on Change Order Form provided by Architect.

1.6 CONSTRUCTION CHANGE DIRECTIVE


1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)
PART 3 - EXECUTION (Not Used)
END OF SECTION 01250
SECTION 01290 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Sections include the following:

1. Division 1 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
2. Division 1 Section “Project Closeout” for additional requirements related to Final Payment application.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
   a. Application for Payment forms with Continuation Sheets.
   b. Submittals Schedule.
   c. Contractor's Construction Schedule showing Phased Construction.

2. Submit the Schedule of Values to Design Professional at Pre-Construction Meeting.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
1. Identification: Include the following Project identification on the Schedule of Values:
   a. Project name and location.
   b. Project Number.
   c. Name of Design Professional.
   d. Design Professional's project number.
   e. Contractor's name and address.
   f. Date of submittal.

2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
   a. Related Specification Section or Division.
   b. Description of the Work.
   c. Change Orders (numbers) that affect value.
   d. Dollar value.

3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.

4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
   a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.

6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

7. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

8. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

9. Project Closeout – Provide a separate line item for performing project closeout procedures.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Design Professional and paid for by Owner.
1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: Progress payments shall be submitted to Design Professional by the fifth day of the month. The period covered by each Application for Payment is one month, ending on the last day of the month or as otherwise agreed to.

C. Payment Application Forms: Use forms provided by Owner for Applications for Payment. Sample copies are available from the Owner.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Design Professional will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

E. Transmittal: Submit (1) One signed and notarized original copy of each Application for Payment to Design Professional by a method ensuring receipt.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
2. All signatures shall be in blue ink.

F. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of Values.
3. Contractor's Construction Schedule (preliminary if not final).
4. Submittals Schedule (preliminary if not final).
5. List of Contractor's staff assignments.

G. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete (Phased).

1. Provide documents per Section 01770 – Project Closeout.

H. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted per Specification Section 01770 – Project Closeout.

1. Provide documents per Section 01770 – Project Closeout.
PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01290
PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY
A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. General project coordination procedures.
   2. Administrative and supervisory personnel.
   3. Requests for Information (RFIs).
   4. Project meetings.
B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
C. Related Sections:
   1. Division 1 Section "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
   2. Division 1 Section "Execution Requirements" for procedures for coordinating general installation.
   3. Division 1 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS
A. RFI: Request from Owner, Design Professional, or Contractor seeking information from each other during construction.

1.4 COORDINATION
A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
   1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
   2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.
B. 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 to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Startup and adjustment of systems.
8. Project closeout activities.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.5 KEY PERSONNEL

A. Key Personnel Names: At Pre-Construction Meeting, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of list in designated location. Keep list current at all times.

1.6 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Design Professional will return RFIs submitted to Design Professional by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project No.
2. Project name and location
3. Date.
4. Name of Contractor.
5. Name of Design Professional.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
   a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Standard Request for Information Form.

D. Design Professional's Action: Design Professional will review each RFI, determine action required, and respond. Allow seven working days for Design Professional's response for each RFI. RFIs received by Design Professional after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:
   a. Requests for approval of submittals.
   b. Requests for approval of substitutions.
   c. Requests for coordination information already indicated in the Contract Documents.
   d. Requests for adjustments in the Contract Time or the Contract Sum.
   e. Requests for interpretation of Design Professional's actions on submittals.
   f. Incomplete RFIs or inaccurately prepared RFIs.

2. Design Professional's action may include a request for additional information, in which case Design Professional's time for response will date from time of receipt of additional information.

3. Design Professional's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 1 Section "Contract Modification Procedures."
   a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Design Professional in writing within seven days of receipt of the RFI response.

E. On receipt of Design Professional's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Design Professional within seven days if Contractor disagrees with response.

F. RFI Log: Prepare, maintain, and submit a tabular log in digital format of RFIs organized by the RFI number. Log shall contain the following:

1. Project No.
2. Project name and location.
3. Name and address of Contractor.
4. Name and address of Design Professional.
5. RFI number including RFIs that were dropped and not submitted.
6. RFI description.
7. Date the RFI was submitted.
8. Date Design Professional's response was received.

1.7 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Design Professional of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Design Professional, within three days of the meeting.

B. Preconstruction Conference: The Architect will schedule a preconstruction conference before starting construction, at a time convenient to the Owner and the Contractor. The meeting will review responsibilities and personnel assignments. The Design Professional will chair the meeting and the Design Professional will distribute minutes within three (3) days after the meeting.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner, Design Professional, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:
   a. Tentative construction schedule.
   b. Phasing.
   c. Critical work sequencing and long-lead items.
   d. Designation of key personnel and their duties.
   e. Lines of communications.
   f. Procedures for processing field decisions and Change Orders.
   g. Procedures for RFIs.
   h. Procedures for testing and inspecting.
   i. Procedures for processing Applications for Payment.
   j. Distribution of the Contract Documents.
   k. Submittal procedures.
   l. Preparation of record documents.
   m. Use of the premises and existing building.
   n. Work restrictions.
   o. Working hours.
   p. Owner's occupancy requirements.
   q. Responsibility for temporary facilities and controls.
   r. Procedures for disruptions and shutdowns.
s. Construction waste management and recycling.
t. Parking availability.
u. Office, work, and storage areas.
v. Equipment deliveries and priorities.
w. First aid.
x. Security.
y. Progress cleaning.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Design Professional and Owner of scheduled meeting dates.

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

   b. Options.
   c. Related RFIs.
   d. Related Change Orders.
   e. Purchases.
   f. Deliveries.
   g. Submittals.
   h. Review of mockups.
   i. Possible conflicts.
   j. Compatibility problems.
   k. Time schedules.
   l. Weather limitations.
   m. Manufacturer's written recommendations.
   n. Warranty requirements.
   o. Compatibility of materials.
   p. Acceptability of substrates.
   q. Temporary facilities and controls.
   r. Space and access limitations.
   s. Regulations of authorities having jurisdiction.
   t. Testing and inspecting requirements.
   u. Installation procedures.
   v. Coordination with other work.
   w. Required performance results.
   x. Protection of adjacent work.
   y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.

4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at monthly intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner and Design Professional, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

   a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

       1) Review schedule for next period.

   b. Review present and future needs of each entity present, including the following:

       1) Interface requirements.
       2) Sequence of operations.
       3) Status of submittals.
       4) Deliveries.
       5) Off-site fabrication.
       6) Access.
       7) Site utilization.
       8) Temporary facilities and controls.
       9) Progress cleaning.
      10) Quality and work standards.
      11) Status of correction of deficient items.
      12) Field observations.
      13) Status of RFIs.
      14) Status of proposal requests.
      15) Pending changes.
      16) Status of Change Orders.
      17) Pending claims and disputes.
      18) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

   a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01310
SECTION 01320 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's construction schedule.
2. Construction schedule updating reports.
3. Daily construction reports.
4. Site condition reports.
5. Special reports.

B. Related Requirements:

1. Section 01330 "Submittal Procedures" for submitting schedules and reports.
2. Section 01400 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

C. Event: The starting or ending point of an activity.

D. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:
   1. One paper copy.

B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
   1. Submit a pdf of schedule and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

C. Construction Schedule Updating Reports: Submit with Applications for Payment.

D. Daily Construction Reports: Submit at weekly intervals.

1.5 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.
   1. Secure time commitments for performing critical elements of the Work from entities involved.
   2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
   1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
   1. Activity Duration: Define activities so no activity is longer than 20 days.
   2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 30 days, as separate activities in schedule.
Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.


4. Startup and Testing Time: Include no fewer than 5 days for startup and testing.

5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion and allow time for Design Professional's administrative procedures necessary for certification of Substantial Completion.

6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.

2. Work Restrictions: Show the effect of the following items on the schedule:
   a. Coordination with existing construction.
   b. Limitations of continued occupancies.
   c. Uninterruptible services.
   d. Use of premises restrictions.

3. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
   a. Submittals.
   b. Fabrication.
   c. Deliveries.
   d. Installation.
   e. Tests and inspections.
   f. Adjusting.
   g. Startup and placement into final use and operation.

4. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion and the following interim milestones:

1. Start of on-site work in each building.
2. Substantial Completion of each building.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART OR BAR CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 10 days of date established for the Notice to Proceed or at the Contractors’ option provide a Bar Chart type Construction Schedule
B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

2.3 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events.
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.

B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.4 SPECIAL REPORTS

A. General: Submit special reports to Owner and Design Professional within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At two-week intervals, update schedule to reflect actual construction progress and activities. Issue schedule two days before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Design Professional, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01320
SECTION 01323 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
A. Section includes administrative and procedural requirements for the following:
  1. Preconstruction photographs.
  2. Periodic construction photographs.
  3. Final completion construction photographs.
B. Related Requirements:
  1. Section 01770 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.
  2. Section 02419 "Selective Demolition" for photographic documentation before selective demolition operations commence.

1.3 INFORMATIONAL SUBMITTALS
A. Digital Photographs: Submit image files within three (3) days of taking photographs.
   1. Identification: Provide the following information with each image description:
      a. Name of Project.
      b. Name of Contractor.
      c. Date photograph was taken.
      d. Description of location, vantage point, and direction.

1.4 CONSTRUCTION PHOTOGRAPHS
A. General: Take photographs with maximum depth of field and in focus.
B. Preconstruction Photographs: Before commencement of excavation, commencement of demolition and starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
   1. Flag excavation areas before taking construction photographs.
2. Take photographs to show existing conditions adjacent to property before starting the Work.
3. Take photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

C. Periodic Construction Photographs: Take photographs weekly coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

D. Final Completion Construction Photographs: Take photographs after date of Substantial Completion for submission as Project Record Documents. Architect will inform photographer of desired vantage points.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01323
SECTION 01330 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Sections include the following:

1. Division 1 Section “Product Requirements” for submittal of substitution request.
2. Division 1 Section "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
3. Division 1 Section "Project Closeout" for submitting warranties.
4. Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
5. Division 1 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
6. Divisions 2 through 16 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Design Professional's responsive action.

B. Informational Submittals: Written information that does not require Design Professional's responsive action. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

A. General: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Design Professional for Contractor's use in preparing submittals.

1. Contractor will be required to sign Design Professional’s release form prior to Design Professional’s release of Electronic Drawing files.

B. 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.
   
   a. Design Professional reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Design Professional’s receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

   1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Design Professional will advise Contractor when a submittal being processed must be delayed for coordination.
   
   2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
   
   3. Resubmittal Review: Allow 5 working days for review of each resubmittal.

D. Identification: Place a permanent label or title block on each submittal for identification.

   1. Indicate name of firm or entity that prepared each submittal on label or title block.
   
   2. Provide a space approximately 4 x 5 inches on label or beside title block to record Contractor’s review and approval markings and action taken by Design Professional.
   
   3. Include the following information on label for processing and recording action taken:
      
      a. Project name and Project number.
      
      b. Date.
      
      c. Name and address of Design Professional.
      
      d. Name and address of Contractor.
      
      e. Name and address of subcontractor.
      
      f. Name and address of supplier.
      
      g. Name of manufacturer.
      
      h. Number and title of appropriate Specification Section.
      
      i. Drawing number and detail references, as appropriate.
      
      j. Location(s) where product is to be installed, as appropriate.
      
      k. Other necessary identification.

E. Deviations: Highlight, cloud, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.

F. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Design Professional will return submittals, without review, discard submittals received from sources other than Contractor.

   1. Transmittal Form: Contractor’s standard transmittal form. Provide locations on form for the following information:
      
      a. Project name and project number.
b. Date.
c. Destination (To:).
d. Source (From:).
e. Names of subcontractor, manufacturer, and supplier.
f. Category and type of submittal.
g. Submittal purpose and description.
h. Specification Section number and title.
i. Drawing number and detail references, as appropriate.
j. Transmittal number, numbered consecutively.
k. Remarks.
l. Signature of transmitter.

2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Design Professional on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked "Reviewed" or "Furnish as Corrected".

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Use only final submittals with mark indicating "Reviewed" or "Furnish as Corrected" taken by Design Professional.

1.5 CONTRACTOR'S USE OF DESIGN PROFESSIONAL’S CAD FILES

A. General: At Contractor's written request, copies of Design Professional's CAD files may be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:

1. CAD files may only be used for purposes related to the specific project for which they were requested.
2. All designs, images and representations are to remain solely the copyright of the Design Professional.
3. The Design Professional does not warrant the accuracy of any CAD files and assumes no responsibility for errors, omissions or discrepancies contained therein.
PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

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.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:
   a. Manufacturer's written recommendations.
   b. Manufacturer's product specifications.
   c. Manufacturer's installation instructions.
   d. Standard color charts.
   e. Manufacturer's catalog cuts.
   f. Wiring diagrams showing factory-installed wiring.
   g. Printed performance curves.
   h. Operational range diagrams.
   i. Standard product operation and maintenance manuals.
   k. Compliance with specified referenced standards.
   l. Testing by recognized testing agency.
   m. Application of testing agency labels and seals.
   n. Notation of coordination requirements.

4. Submit Product Data before or concurrent with Samples.
5. Number of Copies: Submit six (6) copies of Product Data, unless otherwise indicated. Design Professional will return two copies. Mark up and retain one returned copy as a Project Record Document.

C. Shop Drawings: Prepare Project-specific information, verified on site and drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   a. Dimensions.
   b. Identification of products.
   c. Fabrication and installation drawings.
   d. Roughing-in and setting diagrams.
   e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
   f. Shopwork manufacturing instructions.
   g. Templates and patterns.
   h. Schedules.
i. Design calculations.

j. Compliance with specified standards.

k. Notation of coordination requirements.

l. Notation of dimensions established by field measurement.

m. Relationship to adjoining construction clearly indicated.

n. Seal and signature of professional engineer if specified.

o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 24 by 36 inches.

3. Number of Copies: Submit six (6) opaque (bond) copies of each submittal. Design Professional will return two copies.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.

2. Identification: Attach label on unexposed side of Samples that includes the following:

   a. Generic description of Sample.
   b. Product name and name of manufacturer.
   c. Sample source.
   d. Number and title of appropriate Specification Section.

3. 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.

   a. 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.
   b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

4. 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.

   a. Number of Samples: Submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Design Professional will return submittal with options selected.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing
color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. **Number of Samples:** Submit three sets of Samples. Design Professional will retain two Sample sets; remainder will be returned.

1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.

2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit sets of units that show approximate limits of variations.

**E. Product Schedule or List:** As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product.
2. Number and name of room or space.
3. Location within room or space.
4. Number of Copies: Submit six copies of product schedule or list, unless otherwise indicated. Design Professional, will return two copies.

**F. Contractor's Construction Schedule:** Comply with requirements specified in Division 1 Section "Construction Progress Documentation" for Construction Manager's action.

**G. Submittals Schedule:** Comply with requirements specified in Division 1 Section "Construction Progress Documentation."

**H. Application for Payment:** Comply with requirements specified in Division 1 Section "Payment Procedures."

**I. Schedule of Values:** Comply with requirements specified in Division 1 Section "Payment Procedures."

**2.2 INFORMATIONAL SUBMITTALS**

**A. General:** Prepare and submit Informational Submittals required by other Specification Sections.

1. **Number of Copies:** Submit six (6) copies of each submittal, unless otherwise indicated. Design Professional will not return copies.

2. **Certificates and Certifications:** Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

**B. Contractor's Construction Schedule:** Comply with requirements specified in Division 1 Section "Construction Progress Documentation."
C. 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.
8. Design Professional will review submittals that include MSDSs.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Design Professional.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 DESIGN PROFESSIONAL'S ACTION

A. General: Design Professional will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Design Professional will review each submittal, make marks to indicate corrections or modifications required, and return it. Design Professional will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. Reviewed.
2. Furnish as Corrected.
3. Revise and resubmit.
4. Rejected.

C. Informational Submittals: Design Professional will review each submittal and will not return it or, will return it if it does not comply with requirements. Design Professional will forward each submittal to appropriate party.
D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

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

END OF SECTION 01330
SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
   A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
   B. Related Requirements:
      1. Section 01100 "Summary" for limitations on work restrictions and utility interruptions.

1.3 USE CHARGES
   A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
   B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
   C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS
   A. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

1.5 QUALITY ASSURANCE
   A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
   B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portable Chain-Link Fencing: Minimum 2-inch thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts. Provide bases for supporting posts.

B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

C. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.

2.2 TEMPORARY FACILITIES

A. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations if necessary.

1. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: All utilities are existing.

B. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
   1. Prior to commencing work, isolate the HVAC system in area where work is to be performed.
   2. Maintain dust partitions as required by Owner during the Work.
   3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

C. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

D. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

E. Telephone Service: Provide superintendent with cellular telephone.

3.3 SUPPORT FACILITIES INSTALLATION

A. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

B. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
   1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
   2. Remove snow and ice as required to minimize accumulations.

C. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
   1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Temporary Erosion and Sedimentation Control: Comply with requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Section 02230 "Site Clearing."

D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

F. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

G. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

H. Temporary Partitions: At Owner’s direction, provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.

1. Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints.

2. Provide walk-off mats at each entrance through temporary partition.

I. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard, replace, or clean stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use permanent HVAC system to control humidity.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
   a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
   b. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.

2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01770 "Closeout Procedures."

END OF SECTION 01500
SECTION 01635 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY
A. Section includes administrative and procedural requirements for substitutions.
B. Related Sections:
   1. Division 01 Section "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
   2. Divisions 2 through 16 Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS
A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
   1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
   2. Substitutions for Convenience: Changes proposed by Contractor that are not required in order to meet other Project requirements but may offer advantage to Contractor.

1.4 SUBMITTALS
A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
   1. Substitution Request Form: Use CSI Form 13.1A.
   2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
      a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
      b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.

e. Samples, where applicable or requested.

f. Certificates and qualification data, where applicable or requested.

g. List of similar installations for completed projects with project names and addresses and names and addresses of Design Professionals and owners.

h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.

j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.

k. Cost information, including a proposal of change, if any, in the Contract Sum.

l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.

m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Design Professional's Action: If necessary, Design Professional will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Design Professional will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Design Professional's Supplemental Instructions for minor changes in the Work.

b. Use product specified if Design Professional does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage qualified testing agency to perform compatibility tests recommended by manufacturers.
1.6 PROCEDURES

A. Coordination: Modify or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Design Professional will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Design Professional will return requests without action, except to record noncompliance with these requirements:

   a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   b. Substitution request is fully documented and properly submitted.
   c. Requested substitution will not adversely affect Contractor's construction schedule.
   d. Requested substitution has received necessary approvals of authorities having jurisdiction.
   e. Requested substitution is compatible with other portions of the Work.
   f. Requested substitution has been coordinated with other portions of the Work.
   g. Requested substitution provides specified warranty.
   h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed after 10 days prior to bid opening.

C. Substitutions for Convenience: Design Professional will consider requests for substitution if received before 10 days prior to bid opening. Requests received after that time may be considered or rejected at discretion of Design Professional.

1. Conditions: Design Professional will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Design Professional will return requests without action, except to record noncompliance with these requirements:

   a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Design Professional for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
   b. Requested substitution does not require extensive revisions to the Contract Documents.
c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
d. Substitution request is fully documented and properly submitted.
e. Requested substitution will not adversely affect Contractor's construction schedule.
f. Requested substitution has received necessary approvals of authorities having jurisdiction.
g. Requested substitution is compatible with other portions of the Work.
h. Requested substitution has been coordinated with other portions of the Work.
i. Requested substitution provides specified warranty.
j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01635
SECTION 01730 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.

B. Related Requirements:

1. Section 01100 "Summary" for limits on use of Project site.
2. Section 01330 "Submittal Procedures" for submitting surveys.
3. Section 01770 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
4. Section 02419 "Selective Demolition" for demolition and removal of selected portions of the building.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.4 PREINSTALLATION MEETINGS

A. Cutting and Patching Conference: Conduct conference at Project site unless covered during pre-construction meeting.
1. Prior to commencing work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:

   a. Contractor's superintendent.
   b. Trade supervisor responsible for cutting operations.
   c. Trade supervisor(s) responsible for patching of each type of substrate.
   d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affecting by cutting and patching operations.

2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

   1. Structural Elements: When cutting and patching structural elements, if different than indicated, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
   2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety that are not indicated to be cut. Field verify prior to cutting.
   3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
   4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.
B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services; and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.
3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility and Owner that may be necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01310 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

C. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Where possible, select tools or equipment that minimize production of excessive noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Repair or remove and replace damaged, defective, or nonconforming Work.

1. Comply with Section 01770 "Closeout Procedures" for repairing or removing and replacing defective Work.
3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Temporary Support: Provide temporary support and shoring of work to be cut.

C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01100 "Summary."

E. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

F. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
   a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
   b. Restore damaged pipe covering to its original condition.
3. 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 in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

   a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.

5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

G. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

   1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.

   2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.


   2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.

   3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

      a. Use containers intended for holding waste materials of type to be stored.
4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
   1. Remove liquid spills promptly.
   2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with Owner and Contractor.

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3.10 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

C. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01730
SECTION 01770 – CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:

1. Inspection procedures.
2. Reinspection.
3. Final Acceptance.
4. Closeout Procedures

B. Related Sections include the following:

1. Division 1, Section 01781 “Project Record Documents” for project record document requirements.
2. Division 1, Section 01782 “Operation and Maintenance Data” for operating and maintenance manual requirements.

C. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions-2 through -16.

1.3 SUBSTANTIAL COMPLETION

A. Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. (List exceptions in the request).

1. Advise Owner/Agency of pending change-over requirements.
2. Obtain and submit releases enabling the Owner/Agency unrestricted use of the Work and access to services and utilities.
3. Submit record drawings, maintenance and operational manuals, and similar final record information.

   a. Submittal of record drawings, O & M Manuals, etc., must occur a minimum of 15 days prior to a written request for Substantial Completion inspection.

4. Deliver tools, spare parts, extra stock, and similar items, if any required in Divisions 2 through 16.
5. Complete start-up testing of systems, and instruction of the Owner/Agency's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.
6. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.
7. All systems, including emergency systems, shall have been completely tested in the presence of the appropriate Project Engineer. Submit a form signed by the appropriate engineer stating this has been done in their presence and all systems are working as designed and satisfactorily.

B. Substantial Completion Inspection Procedures: On receipt by the Design Professional of a written request from the Contractor for substantial completion inspection (punch list items), the Design Professional will either proceed with inspection or advise the Contractor of unfilled requirements (paragraph A under 1.3 above). The Design Professional will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The certificate of substantial completion will be issued when the project is substantially complete.
2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.4 FINAL ACCEPTANCE TO MAKE FINAL PAYMENT

A. Procedures: Before requesting final inspection for certification of final acceptance and final payment the following has to be completed. List exceptions in the request.

1. Submit the final payment request at the end of the final phase of work with required releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and completed operations where required.
2. Submit a certified copy of the Design Professional's substantial completion inspection list of items that were to be completed and corrected, stating that each item has been completed or otherwise resolved for acceptance.
3. Record Drawings must have been submitted to the Design Professional’ and approved (paragraph A under 1.3, Item 3 above).
4. Maintenance and Operations manuals must have been submitted to the Design Professional and approved (paragraph A under 1.3, Item 3 above).
5. Submit specific warranties, final certifications and similar documents.
6. Any maintenance and operational training of Agency personnel must have been completed (paragraph A under 1.3, Item 3 above).
7. Consent of Surety (A.I.A. Form G707) Release of Claims and Contractor's Affidavit of Payment of Debts and Claims (A.I.A. Form G706) must be executed by the contractor and submitted to the Design Professional.
8. A final pay estimate must be submitted requesting 100% payment including retainage. The documents in item 7 must be attached to the Final Pay Request.
9. State of Idaho Tax Release. Request for Tax Release Form is included in the agreement and is to be submitted to the Idaho State Tax Commission. The Tax Release issued by the Tax Commission is to be submitted with Closeout Documents.
B. Final Inspection Procedure: The Design Professional will reinspect the Work upon receipt of notice that the Work, including punch list items from earlier inspections have been completed.

1. Upon completion of reinspection, the Design Professional will prepare a letter of final acceptance or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 0.1 CLOSEOUT PROCEDURES

A. Operating and Maintenance Instructions: Arrange for each installer of equipment that requires regular maintenance to meet with the Owner/Agency's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:

1. Maintenance manuals.
2. Record documents.
3. Spare parts and materials (if any).
4. Tools.
5. Lubricants.
6. Fuels.
7. Identification systems.
8. Control sequences.
9. Hazards.
10. Cleaning.
11. Warranties.
12. Maintenance and similar continuing commitments.

3.2 FINAL ACCEPTANCE

A. The Contractor is required to submit to the Design Professional required documents.

1. The Design Professional will not approve final payment until all items have been received, reviewed and found to be acceptable and in compliance with the Contract Documents.

END OF SECTION 01770
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for Project Record Documents.

B. Project Record Documents required include:
   1. Marked-up (red line corrected) copies of Contract Drawings.
   2. Marked-up (red line corrected) copies of Shop Drawings and Product Data Submittals.
   3. Marked-up (red line corrected) copies of Specifications, addenda and Change Orders.
   4. Field records for variable and concealed conditions.

C. Specific record copy requirements that expand requirements of this Section are included in the individual Sections of Divisions-2 through -16.

D. General project closeout requirements are included in Division 1 Section "Project Closeout."

E. Maintenance of Documents: Store record documents in the field office apart from Contract Documents used for construction. Do not permit Project Record Documents to be used for construction purposes. Maintain record documents in good order, and in a clean, dry, legible condition. Make documents available at all times for inspection by the Design Professional.

1.3 RECORD DRAWINGS

A. Mark-up (red line corrected) Procedure: During the construction period, maintain a set of (1 copy) black-line white-prints of Contract Drawings and Shop Drawings for Project Record Document purposes.

1. Mark these Drawings to indicate the actual installation where the installation varies appreciably from the installation shown originally. Give particular attention to information on concealed elements which would be difficult to identify or measure and record later. Items required to be marked include but are not limited to:

   a. Dimensional changes to the Drawings.
   b. Revisions to details shown on the Drawings.
   c. Locations and depths of underground utilities.
   d. Revisions to routing of piping and conduits.
   e. Revisions to electrical circuitry.
f. Actual equipment locations.
g. Locations of concealed internal utilities.
h. Changes made by Change Order.
i. Details not on original Contract Drawings.

2. Mark completely and accurately record prints of Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions. Where Shop Drawings are marked, show cross-reference on Contract Drawings location.

3. Mark record sets with red erasable colored pencil; use other colors to distinguish between changes for different categories of the Work at the same location.

4. Mark important additional information which was either shown schematically or omitted from original Drawings.

5. Note construction change directive numbers, alternate numbers, Change Order numbers and similar identification.

6. Responsibility for Markup: Where feasible, the individual or entity who obtained record data, whether the individual or entity is the installer, subcontractor, or similar entity, is required to prepare the mark-up on record Drawings.

a. Accurately record information in an understandable Drawing technique. Record drawings will be returned to the contractor to correct the information that is not understandable or not clearly annotated.

b. Record data as soon as possible after it has been obtained. In the case of concealed installations, record and check the mark-up prior to concealment.

7. At time of Substantial Completion, submit record Drawings to Design Professional for Owner/Agency's records. Organize into sets, bind and label sets for Owner/Agency's continued use.

B. Copies and Distribution: After completing the preparation of record drawings bind each set with durable paper cover sheets, with appropriate identification, including titles, dates and other information on cover sheets prior to submitting to Design Professional for Owner/Agency's records.

1.4 RECORD SPECIFICATIONS

A. During the construction period, maintain one (1) copy of the Project Specifications, including addenda and modifications issued, for Project Record Document purposes.

1. Mark the Specifications to indicate the actual installation where the installation varies substantially from that indicated in Specifications and modifications issued. Note related Project Record Drawing information, where applicable. Give particular attention to information on concealed installations that would be difficult to identify or measure and record later.

a. In each Specification Section where products, materials or units of equipment are specified or scheduled, mark the copy with the proprietary name and model number of the product furnished.

b. Note related record Product Data, where applicable. For each principal product specified, indicate whether record Product Data has been submitted in maintenance manual instead of submitted as record Product Data.
2. Upon completion of mark-up, submit record Specifications to the Design Professional for Owner/Agency's records.
   a. The Contractor for General Construction is responsible for submitting the complete set of record Specifications as specified.

1.5 RECORD PRODUCT DATA

A. During the construction period, maintain one (1) copy of each Product Data submittal for Project Record Document purposes.

1. Mark Product Data to indicate the actual product installation where the installation varies substantially from that indicated in Product Data submitted. Include significant changes in the product delivered to the site, and changes in manufacturer's instructions and recommendations for installation.
2. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
3. Note related Change Orders and mark-up of record Drawings, where applicable.
4. Upon completion of mark-up, submit a complete set of record Product Data to the Design Professional for the Owner/Agency's records.
5. Where record Product Data is required as part of maintenance manuals, submit marked-up Product Data as an insert in the manual, instead of submittal as record Product Data.

1.6 MISCELLANEOUS RECORD SUBMITTALS

A. Refer to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Immediately prior to Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for use and reference. Submit to the Design Professional for the Owner/Agency's records.

1. Categories of requirements resulting in miscellaneous records include, but are not limited to the following:
   a. Locations and elevations of underground lines.
   b. Certifications received in lieu of labels on bulk products.
   c. Final inspection and correction procedures.
   d. Inspections and certifications by governing authorities.
   e. Final inspection and correction procedures.
PART 2 - PRODUCTS (not applicable)

PART 3 - EXECUTION

3.1 RECORDING

1. Post changes and modifications to the Documents as they occur. Do not wait until the end of the Project. The Design Professional will periodically review record documents to assure compliance with this requirement.

END OF SECTION 01781
SECTION 01782 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Operation manuals for systems, subsystems, and equipment.
3. Maintenance manuals for the care and maintenance of systems and equipment as well as specialty products, materials, and finishes.

B. Related Sections include the following:

1. Division 1 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Division 1 Section "Closeout Procedures" for submitting operation and maintenance manuals.
3. Division 1 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
4. Divisions 2 through 16 Sections for specific operation and maintenance manual requirements for products in those Sections.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

A. Initial Submittal: Submit (2) two draft copies of each manual at least (15) fifteen days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Design Professional will return (1 copy) of draft and mark whether general scope and content of manual are acceptable.

1. Final Submittal: Submit (3) copies of each manual in final form prior to substantial completion inspection.
1.5 COORDINATION

A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:
   1. List of documents.
   2. List of systems.
   3. List of equipment.
   4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with the same designation used in the Contract Documents.

2.2 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
   1. Title page.
   2. Table of contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
   1. Subject matter included in manual.
   2. Name and address of Project.
   3. Project Number.
   4. Name and address of Owner.
   5. Date of submittal.
   6. Name, address, and telephone number of Contractor.
   7. Name and address of Design Professional.
8. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (115-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
   a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
   b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, Project Number and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.

4. Supplementary Text: Prepared on 8-1/2-by-11-inch (115-by-280-mm), 20-lb/sq. ft. (75-g/sq. m) white bond paper.

5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions.
2. Performance and design criteria if Contractor is delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Precautions against improper use.
9. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Engineering data and tests.
8. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Routine and normal operating instructions.
3. Regulation and control procedures.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

2.4 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
5. Reordering information for specially manufactured products.
D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
1. Do not use original Project Record Documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared Record Drawings in Division 1 Section "Project Record Documents."

F. Comply with Division 1 Section "Closeout Procedures" for the schedule for submitting operation and maintenance documentation.

END OF SECTION 01782
SECTION 02419 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Demolition and removal of selected portions of building or structure.

B. Related Requirements:
   1. Section 01100 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
   2. Section 01730 "Execution" for cutting and patching procedures.
   3. Section 01351 "Alteration Project Procedures" for general protection and work procedures for alteration projects.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse or store as directed.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.
1.5 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.
   1. Inspect and discuss condition of construction to be selectively demolished.
   2. Review structural load limitations of existing structure.
   3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
   5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

C. Schedule of Selective Demolition Activities: Indicate the following:
   1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's building manager's on-site operations are uninterrupted.
   2. Interruption of utility services. Indicate how long utility services will be interrupted.
   3. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

D. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before Work begins.

1.7 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
   1. Before selective demolition, Owner will remove the following items:

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review existing construction and notify owner if conditions are noticeably different than indicated.

C. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

D. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.

1. Comply with requirements specified in Section 013233 "Photographic Documentation."
2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

3.3 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furnishings and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches.
5. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
6. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
7. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
8. Dispose of demolished items and materials promptly.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Removed and Reinstalled Items:
   1. Clean and repair items to functional condition adequate for intended reuse.
   2. Pack or crate items after cleaning and repairing. Identify contents of containers.
   3. Protect items from damage during transport and storage.
   4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

C. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."

D. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site.
   1. Do not allow demolished materials to accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn demolished materials.
3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 02419
SECTION 02751 - CEMENT CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Divisions 700 and 800 of the current edition of the Idaho Standards for Public Works Construction.

1.2 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:

1. Walkways.
2. Joint Sealer.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.4 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Qualification Data: For testing agency.

D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials.

E. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.
1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.


D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities or for Owner’s operation.

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:

1. Portland Cement: ASTM C 150, Type II
   a. Fly Ash: ASTM C 618, Class F.

B. Normal-Weight Aggregates: ASTM C 33, Class 4S coarse aggregate, uniformly graded. Provide aggregates from a single source.

2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M.

E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.3 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

1. Products:
   a. Axim Concrete Technologies; Cimfilm.
   b. Burke by Edeco; BurkeFilm.
   c. ChemMasters; Spray-Film.
   d. Conspec Marketing & Manufacturing Co., Inc.; Aquafilm.
   e. Dayton Superior Corporation; Sure Film.
   f. Euclid Chemical Company (The); Eucobar.
   g. Kaufman Products, Inc.; Vapor Aid.
   h. Lambert Corporation; Lambco Skin.
   i. L&M Construction Chemicals, Inc.; E-Con.
   j. MBT Protection and Repair, ChemRex Inc.; Confilm.
   l. Metalcrete Industries; Waterhold.
   m. Nox-Crete Products Group, Kinsman Corporation; Monofilm.
   n. Sika Corporation, Inc.; SikaFilm.
   o. Symons Corporation; Finishing Aid.

2.4 RELATED MATERIALS


2.5 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.

B. Proportion mixtures to provide normal-weight concrete with the following properties:

2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.50.
3. Slump Limit: 5 inches plus or minus 1 inch.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

1. Air Content: 5-1/2 percent plus or minus 1.5 percent for 1-1/2-inch nominal maximum aggregate size.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

F. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals as follows:

1. Fly Ash or Pozzolan: 25 percent.
2. Ground Granulated Blast-Furnace Slag: 50 percent.
3. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent, with fly ash or pozzolan not exceeding 25 percent.

2.6 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For concrete mixes of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For concrete mixes larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.

   1. Completely proof-roll subbase in one direction. Limit vehicle speed to 3 mph.
   2. Subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch require correction according to requirements in Division 2 Section "Earthwork."

C. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.

1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
2. Provide tie bars at sides of pavement strips where indicated.
3. Butt Joints: Use epoxy bonding adhesive at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 50 feet, unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows to match jointing of existing adjacent concrete pavement:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
3. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.
E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

F. Existing Joints: Where noted on drawings, remove foreign substances, incompressibles and free water from joint opening. For proper adhesion, joints must be clean and surface dry. Dust, dirt and laitance shall be removed prior to application. Proper joint design practices and applications must be followed for successful performance. SOF-SEAL shall be used on joints not less than ¼” wide. A 2:1 width-to-depth ratio shall be maintained. For straight joint edges, mask off top surfaces with masking tape. To control sealant depth, insert KOOL-ROD™ backer rod or DECK-O FORM® from W.R.Meadows in the joint before sealing. For larger joints where additional support is required, use a non-asphalt joint filler, such as CERAMAR® flexible foam expansion joint filler from W.R. Meadows.

3.5 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site.

F. Do not add water to fresh concrete after testing.

G. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

H. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

I. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.

1. Remove and replace concrete that has been placed for more than 15 minutes without being covered by top layer, or use bonding agent if approved by Architect.
J. Screed pavement surfaces with a straightedge and strike off.

K. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

L. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

M. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.

2. Do not use frozen materials or materials containing ice or snow.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.

N. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.

3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.6 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.7 CONCRETE PROTECTION AND CURING
A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding and bull floating or darbying concrete, but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moist Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

F. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

G. Allow concrete pavement to cure for 10 days and be dry before starting pavement marking.

H. Sweep and clean surface to eliminate loose material and dust.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Owner to perform field tests and inspections and prepare test reports.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least 1 composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mix placed each day.
a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.

4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.

5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.

6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.

a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.

G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.9 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.
B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 02751
SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Footings.
2. Foundation walls.
3. Slabs-on-grade.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect.
1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Welding certificates.

C. Material Certificates: For each of the following, signed by manufacturers:
   1. Cementitious materials.
   2. Admixtures.
   3. Form materials and form-release agents.
   4. Steel reinforcement and accessories.
   5. Curing compounds.
   6. Floor and slab treatments.
   8. Adhesives.
   9. Vapor retarders.
  10. Semirigid joint filler.
  12. Repair materials.

D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
   1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

E. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

F. Field quality-control reports.

G. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

H. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
   a. Contractor's superintendent.
   b. Independent testing agency responsible for concrete design mixtures.
   c. Ready-mix concrete manufacturer.
   d. Concrete subcontractor.
   e. Special concrete finish subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.
PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
   a. High-density overlay, Class 1 or better.
   b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
   c. Structural 1, B-B or better; mill oiled and edge sealed.
   d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.


E. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.


F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
C. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60, ASTM A 706/A 706M, deformed bars, assembled with clips.

D. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.

E. Deformed-Steel Wire: ASTM A 496/A 496M.

F. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.


2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I/II. Supplement with the following:
   a. Fly Ash: ASTM C 618, Class F.
   b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

2. Blended Hydraulic Cement: ASTM C 595, Type IS, portland blast-furnace slag, Type IP, portland-pozzolan, Type I (PM), pozzolan-modified portland, Type I (SM), slag-modified portland cement.

B. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33, Class 3S, Class 3M, Class 1N coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years’ satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.


2.5 ADMIXTURES


B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Axim Italcementi Group, Inc.; CATEXOL CN-CI.
   b. BASF Construction Chemicals - Building Systems; Rheocrete CNI.
   c. Euclid Chemical Company (The), an RPM company;
   d. Grace Construction Products, W. R. Grace & Co.; DCI.
   e. Sika Corporation; Sika CNI.

D. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. BASF Construction Chemicals - Building Systems; Rheocrete 222+.
   b. Cortec Corporation; MCI-2005NS.
   c. Grace Construction Products, W. R. Grace & Co.; DCI-S.
   d. Sika Corporation; FerroGard 901.
2.6 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Products: Subject to compliance with requirements, provide the following:
   a. Stego Industries, LLC; Stego Wrap 10 mil Class A.

B. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

C. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch sieve, 10 to 30 percent passing a No. 100 sieve, and at least 5 percent passing No. 200 sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.

2.7 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. ChemMasters; Chemsil Plus.
   b. ChemTec Intl; ChemTec One.
   c. Conspec by Dayton Superior; Intraseal.
   d. Curecrete Distribution Inc.; Ashford Formula.
   e. Dayton Superior Corporation; Day-Chem Sure Hard (J-17).
   f. Edoco by Dayton Superior; Titan Hard.
   g. Euclid Chemical Company (The), an RPM company; Euco Diamond Hard.
   h. Kaufman Products, Inc.; SureHard.
   i. L&M Construction Chemicals, Inc.; Seal Hard.
   j. Meadows, W. R., Inc.; LIQUI-HARD.
   k. Metalcrete Industries; FloorSaver.
   l. Nox-Crete Products Group; Duro-Nox.
   m. Symons by Dayton Superior; Buff Hard.
   n. US SPEC, Division of US Mix Products Company; US SPEC Industraseal.
   o. Vexcon Chemicals, Inc.; Vexcon StarSeal PS Clear.

2.8 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Axim Italcementi Group, Inc.; CATEXOL CimFilm.
b. BASF Construction Chemicals - Building Systems; Confilm.
c. ChemMasters; SprayFilm.
d. Conspec by Dayton Superior; Aquafilm.
e. Dayton Superior Corporation; Sure Film (J-74).
f. Edoco by Dayton Superior; BurkeFilm.
g. Euclid Chemical Company (The), an RPM company; Eucobar.
h. Kaufman Products, Inc.; Vapor-Aid.
i. Lambert Corporation; LAMBCO Skin.
j. L&M Construction Chemicals, Inc.; E-CON.
k. Meadows, W. R., Inc.; EVAPRE.
l. Metalcrete Industries; Waterhold.
m. Nox-Crete Products Group; MONOFILM.
n. Sika Corporation; SikaFilm.
o. SpecChem, LLC; Spec Film.
p. Symons by Dayton Superior; Finishing Aid.
q. TK Products, Division of Sierra Corporation; TK-2120 TRI-FILM.
r. Unitex; PRO-FILM.
s. Vexcon Chemicals, Inc.; Certi-Vex Enviocure Set.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
b. BASF Construction Chemicals - Building Systems; Kure 200.
c. ChemMasters; Safe-Cure Clear.
d. Conspec by Dayton Superior; W.B. Resin Cure.
e. Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W).
f. Edoco by Dayton Superior; Res X Cure WB.
g. Euclid Chemical Company (The), an RPM company; Kurez W VOX; TAMMSCURE WB 30C.
i. Lambert Corporation; AQUA KURE - CLEAR.
j. L&M Construction Chemicals, Inc.; L&M Cure R.
k. Meadows, W. R., Inc.; 1100-CLEAR.
l. Nox-Crete Products Group; Resin Cure E.
m. Right Pointe; Clear Water Resin.
n. SpecChem, LLC; Spec Rez Clear.
o. Symons by Dayton Superior; Resi-Chem Clear.
p. TK Products, Division of Sierra Corporation; TK-2519 DC WB.
q. Vexcon Chemicals, Inc.; Certi-Vex Enviocure 100.
F. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

1. **Products:** Subject to compliance with requirements, provide one of the following:
   
a. BASF Construction Chemicals - Building Systems; Kure-N-Seal 25 LV.
b. ChemMasters; Spray-Cure & Seal Plus.
c. Conspec by Dayton Superior; Sealcure 1315.
d. Dayton Superior Corporation; Day-Chem Cure and Seal (J-22UV).
e. Edoco by Dayton Superior; Cureseal 1315.
f. Euclid Chemical Company (The), an RPM company; Super Diamond Clear; LusterSeal 300.
g. Kaufman Products, Inc.; Sure Cure 25.
h. Lambert Corporation; UV Super Seal.
i. L&M Construction Chemicals, Inc.; Lumiseal Plus.
k. Metalcrete Industries; Seal N Kure 30.
l. Right Pointe; Right Sheen 30.
m. Vexcon Chemicals, Inc.; Certi-Vex AC 1315.

2. **VOC Content:** Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.9 RELATED MATERIALS


B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.

C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

   1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Reglets: Fabricate reglets of not less than 0.022-inch thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

F. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.
2.10 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.11 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 20 percent.
2. Combined Fly Ash and Pozzolan: 20 percent.
3. Ground Granulated Blast-Furnace Slag: 40 percent.
4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 40 percent portland cement minimum, with fly ash or pozzolan not exceeding 20 percent.
5. Silica Fume: 5 percent.
6. Combined Fly Ash, Pozzolans, and Silica Fume: 30 percent with fly ash or pozzolan not exceeding 20 percent and silica fume not exceeding 5 percent.
7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 40 percent with fly ash or pozzolans not exceeding 20 percent and silica fume not exceeding 5 percent.
C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.
   1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
   2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
   3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
   4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS
A. Footings: Proportion normal-weight concrete mixture indicated on plans.
B. Foundation Walls: Proportion normal-weight concrete mixture indicated on plans.
C. Slabs-on-Grade: Proportion normal-weight concrete mixture indicated on plans.

2.13 FABRICATING REINFORCEMENT
A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING
A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.
   1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
   1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
   2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
   3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.
PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
   1. Install keyways, reglets, recesses, and the like, for easy removal.
   2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.
3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 75 percent of its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORES AND RESHORES

A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.

1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.

C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.
3.5 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.6 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.7 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.

2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.

3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.

4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.

5. Space vertical joints in walls at 50’ o.c. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.

2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants are required.

3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Dowelled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.8 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.

2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.


3. Screed slab surfaces with a straightedge and strike off to correct elevations.

4. Slope surfaces uniformly to drains where required.

5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.9 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.
B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic, paint, or another thin-film-finish coating system.

2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:

   a. Specified overall values of flatness, F(F) 25; and of levelness.

3. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.-long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch.

3.11 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.12 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
   c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Reccoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

   a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Reccoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.13 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Do not apply to concrete that is less than three days' old.
3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.14 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

2. After concrete has cured at least 14 days, correct high areas by grinding.

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.

5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.16 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will perform field tests and inspections and prepare test reports.

B. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:
   1. Steel reinforcement placement.
   2. Steel reinforcement welding.
   3. Headed bolts and studs.
   4. Verification of use of required design mixture.
   5. Concrete placement, including conveying and depositing.
   6. Curing procedures and maintenance of curing temperature.
   7. Verification of concrete strength before removal of shores and forms from beams and slabs.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

   1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
   2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
      a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

   3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
   4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.

6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

7. Compression Test Specimens: ASTM C 31/C 31M.
   a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
   b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
   a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
   b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.

10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).

11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.

14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

E. Measure floor and slab flatness and levelness according to ASTM E 1155 within 48 hours of finishing.
3.17 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 03300
SECTION 04810 - UNIT MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
A. Section Includes:
   1. Concrete masonry units.
   2. Mortar and grout.
   3. Steel reinforcing bars.
   4. Miscellaneous masonry accessories.
   5. Masonry-cell insulation. (See Specification Section 07210 – Building Insulation).

1.3 DEFINITIONS
A. CMU(s): Concrete masonry unit(s).
B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PERFORMANCE REQUIREMENTS
A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
   1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

1.5 ACTION SUBMITTALS
A. Product Data: For each type of product indicated.
B. Shop Drawings: For the following:
   1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
   2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
1.6 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of the following:

1. Masonry units.
   a. Include material test reports substantiating compliance with requirements.
   b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.

2. Cementitious materials. Include brand, type, and name of manufacturer.

3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.

4. Grout mixes. Include description of type and proportions of ingredients.

5. Reinforcing bars.


7. Anchors, ties, and metal accessories.

B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.

2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

C. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

D. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.

B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

D. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockups for each type of exposed unit masonry construction in sizes approximately 48 inches long by 48 inches high by full thickness, including face and backup wythes and accessories.
2. Clean one half of exposed faces of mockups with masonry cleaner as indicated.
3. Protect accepted mockups from the elements with weather-resistant membrane.
4. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
   a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
   b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.
5. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

   A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

   B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

   C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

   D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

   E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 PROJECT CONDITIONS

   A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
      1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
      2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

   B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.


PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

2.2 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide square-edged and bullnose units for outside corners where indicated.

B. CMUs: ASTM C 90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
2. Density Classification: Medium weight unless otherwise indicated.
3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.
2.3 MASONRY LINTELS

A. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.4 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Mortar Cement: ASTM C 1329.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Lafarge North America Inc.; Lafarge Mortar Cement or Magnolia Superbond Mortar Cement.

E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Davis Colors; True Tone Mortar Colors.
   b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
   c. Solomon Colors, Inc.; SGS Mortar Colors.

F. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.


H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Euclid Chemical Company (The); Accelguard 80.
c. Sonneborn Products, BASF Aktiengesellschaft; Trimix-NCA.

I. Water: Potable.

2.5 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).

2.6 MISCELLANEOUS ANCHORS

A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron wedge-type inserts.

B. Anchor Bolts: Headed or L-shaped steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

C. Postinstalled Anchors: Torque-controlled expansion anchors or chemical anchors.

1. Load Capacity: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

2. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5 unless otherwise indicated.


2.7 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

1. Products: Subject to compliance with requirements, provide one of the following:
2.8 MASONRY-CELL INSULATION

A. Foamed-in-Place Insulation: See Specification Section 07210.

2.9 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Diedrich Technologies, Inc.
   b. EaCo Chem, Inc.
   c. ProSoCo, Inc.

2.10 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime or mortar cement mortar unless otherwise indicated.
3. For exterior masonry, use portland cement-lime or mortar cement mortar.
4. For reinforced masonry, use portland cement-lime or mortar cement mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

1. For masonry below grade or in contact with earth, use Type S.
2. For reinforced masonry, use Type S.
3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
4. For interior non-load-bearing partitions, Type O may be used instead of Type N.
D. Grout for Unit Masonry: Comply with ASTM C 476.
   1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
   2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi (14 MPa).
   3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
   2. Verify that foundations are within tolerances specified.
   3. Verify that reinforcing dowels are properly placed.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
   1. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.
G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
   1. Install compressible filler in joint between top of partition and underside of structure above.
   2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
   3. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:
   1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
   2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
   3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
   4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
3.6 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:

1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated.

3.7 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry as follows:

1. Install preformed control-joint gaskets designed to fit standard sash block.
2. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

3.8 LINTELS

A. Install steel lintels where indicated.

B. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.9 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

3.10 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner may engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Provide special inspections according to the "International Building Code” and Special Inspection Schedule on plans.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for compressive strength.

H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

I. Prism Test: For each type of construction provided, according to ASTM C 1314 at 7 days and at 28 days.

3.11 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleared for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.12 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04810
SECTION 05120 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Structural steel.
   2. Grout.

B. Related Requirements:
   1. Section 09912 "Interior Painting" for surface-preparation and priming requirements.

1.3 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Protected Zone: Structural members or portions of structural members indicated as "Protected Zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.

C. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings.

1.4 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.
1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication of structural-steel components.
   1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
   2. Include embedment Drawings.
   3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
   4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
   5. Identify members and connections of the Seismic-Load-Resisting System.
   6. Indicate locations and dimensions of protected zones.
   7. Indicate demand critical welds.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:
   1. Power source (constant current or constant voltage).
   2. Electrode manufacturer and trade name, for demand critical welds.

1.7 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, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172).

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
   1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

C. Comply with applicable provisions of the following specifications and documents:
   1. AISC 303.
   2. AISC 341 and AISC 341s1.
   3. AISC 360.
   4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
1.8 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear connections required by the Contract Documents to comply with other information and restrictions indicated.

B. Moment Connections: Type FR, fully restrained.

C. Construction: Combined system of moment frame and shear walls.

2.2 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: As indicated.

B. Channels, Angles-Shapes: As indicated.

C. Plate and Bar: As indicated.

D. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.

E. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.

1. Weight Class: As indicated on plans.
2. Finish: Black except where indicated to be galvanized.

F. Welding Electrodes: Comply with AWS requirements.
2.3 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 490 (ASTM F 959M, Type 10.9), compressible-washer type with plain finish.

C. 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.

D. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

E. Unheaded Anchor Rods: ASTM F 1554, Grade 36.

1. Configuration: Straight or Hooked as indicated on plans.
5. Finish: Plain, ASTM A 153/A 153M, Class C.

F. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.

3. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.


2. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened or ASTM A 36/A 36M carbon steel.
3. Finish: Plain, ASTM A 153/A 153M, Class C.

2.4 PRIMER
A. Primer: Fabricator's standard lead- and chromate-free, nonasphalitic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.5 GROUT
A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION
   1. Camber structural-steel members where indicated.
   2. Fabricate beams with rolling camber up.
   3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
   4. Mark and match-mark materials for field assembly.
   5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
   1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 3, "Power Tool Cleaning."
F. 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.
G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
   1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
   2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
   3. Weld threaded nuts to framing and other specialty items indicated to receive other work.
2.7 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 or pretensioned or slip critical as indicated on plans.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.8 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).

2. Surfaces to be field welded.


4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).

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 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 (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils (0.038 mm).

2.9 SOURCE QUALITY CONTROL

A. Testing Agency: Owner may engage a qualified testing agency to perform shop tests and inspections.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
B. Bolted Connections: Inspect and test shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Visually inspect shop-welded connections 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 are not accepted.
   4. Radiographic Inspection: ASTM E 94.

D. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
   1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
   2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
   1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep existing construction and new structural steel secure, plumb and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
   1. Do not remove temporary shoring supporting existing construction until new structure is complete and all grout has attained its design compressive strength.
3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.


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 303, "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 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 or Pretensioned or Slip critical as indicated on the plans.
B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M 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.
2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Owner may engage a qualified special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Owner may engage a qualified testing agency to perform tests and inspections.

C. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.

1. In addition to visual inspection, test and inspect field welds 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 are not accepted.
   c. Ultrasonic Inspection: ASTM E 164.
   d. Radiographic Inspection: ASTM E 94.

E. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.
3.6 REPAIRS AND PROTECTION

A. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

END OF SECTION 05120
SECTION 05500 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal bollards.

1.3 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.5 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
2.2 MISCELLANEOUS MATERIALS

A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

B. Concrete: Comply with requirements in Section 03300 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 4000 psi.

2.3 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

2.4 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 40 steel pipe.

B. Prime bollards with zinc-rich primer.

2.5 STEEL AND IRON FINISHES

A. Shop prime iron and steel items unless they are to be embedded in concrete or unless otherwise indicated.

   1. Shop prime with universal shop primer.

B. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning”.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
B. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLING METAL BOLLARDS

A. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

3.3 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

END OF SECTION 05500
SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Framing with dimension lumber.
   2. Framing with engineered wood products.

B. Related Requirements:
   1. Section 06160 "Sheathing" for roof sheathing, subflooring, and underlayment.

1.3 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.

B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.

C. Exposed Framing: Framing not concealed by other construction.

D. OSB: Oriented strand board.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

1.5 DELIVERY, STORAGE AND HANDLING

A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.
PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 DIMENSION LUMBER FRAMING

A. Joists, Rafters and Other Framing Not Listed Above: No. 2 grade.

1. Species:
   a. Douglas fir-larch; WCLIB or WWPA.
   b. Douglas fir-larch (north); NLGA.

2.3 ENGINEERED WOOD PRODUCTS

A. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.

B. Wood I-Joists: Prefabricated units, I-shaped in cross section, made with solid or structural composite lumber flanges and wood-based structural panel webs, let into and bonded to flanges. Comply with material requirements of and with structural capacities established and monitored according to ASTM D 5055.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Anthony-Domtar Inc.
   b. Boise Cascade Corporation.
   c. Georgia-Pacific Gypsum LLC.
   d. International Beams Inc.
2. Web Material: Either OSB or plywood, complying with DOC PS 1 or DOC PS 2, Exposure 1.
3. Structural Properties: Depths and design values not less than those indicated.

2.4 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
   1. Blocking.
   2. Nailers.
   4. Ledgers.

B. Dimension Lumber Items: No. 2 grade lumber of any species.

C. Concealed Boards: 15 percent maximum moisture content and any of the following species and grades:
   1. Mixed southern pine or southern pine; No. 2 grade; SPIB.
   2. Hem-fir or hem-fir (north); Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
   3. Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.

D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.
2.5 FASTENERS

A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 as appropriate for the substrate.

2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.6 METAL FRAMING ANCHORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cleveland Steel Specialty Co.
2. KC Metals Products, Inc.
3. Phoenix Metal Products, Inc.
4. Simpson Strong-Tie Co., Inc.
5. USP Structural Connectors.

B. Allowable design loads, as published by manufacturer, shall meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.


1. Use for interior locations unless otherwise indicated.

D. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.

1. Use for wood-preservative-treated lumber and where indicated.
E. Joist Hangers: U-shaped joist hangers with 2-inch-long seat and 1-1/4-inch-wide nailing flanges at least 85 percent of joist depth, but not less than indicated on plans.
   1. Thickness: As indicated.

F. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.
   1. Strap Width: As indicated.
   2. Thickness: As indicated.

G. Bridging: Rigid, V-section, nailless type, 0.050 inch thick, length to suit joist size and spacing.

H. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch above base and with 2-inch-minimum side cover, socket 0.062 inch thick, and standoff and adjustment plates 0.108 inch thick.

I. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.
   1. Width: As indicated.
   2. Thickness: As indicated.
   3. Length: As indicated.

J. Rafter Tie-Downs: Bent strap tie for fastening rafters or roof trusses to wall studs below, as indicated. Tie fastens to side of rafter or truss, face of top plates, and side of stud below.

K. Rafter Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening rafters or roof trusses to wall studs below, 2-1/4 inches wide by 0.062 inch thick. Tie fits over top of rafter or truss and fastens to both sides of rafter or truss, face of top plates, and side of stud below.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate nailers, blocking, ledgers and similar supports to comply with requirements for attaching other construction.

C. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

D. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.

E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

F. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

G. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

H. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

2. ICC-ES evaluation report for fastener.

J. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 RAFTER FRAMING INSTALLATION

A. Rafters: Notch to fit exterior wall plates and use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut, place directly opposite each other and nail to ridge member or use metal ridge hangers.

B. Provide special framing as indicated for eaves, overhangs and similar conditions if any.
3.4 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06100
SECTION 06160 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
   A. Section Includes:
      1. Roof sheathing.
      2. Interior sheathing (wall protection).
   B. Related Requirements:
      1. Section 06100 "Rough Carpentry” for plywood backing panels.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.4 DELIVERY, STORAGE, AND HANDLING
   A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS
   A. Plywood: Either DOC PS 1 or DOC PS 2 unless otherwise indicated.
   B. Oriented Strand Board: DOC PS 2.
   C. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
   D. Factory mark panels to indicate compliance with applicable standard.
2.2 ROOF SHEATHING

A. Plywood Roof Sheathing: Exterior, Exposure 1, Structural I sheathing.
   1. Span Rating: Not less than 32/16.
   2. Nominal Thickness: Not less than 15/32.

B. Oriented-Strand-Board Roof Sheathing: Exposure 1, Structural I sheathing.
   1. Span Rating: Not less than 32/16.
   2. Nominal Thickness: Not less than 1/2 inch or as indicated.

2.3 INTERIOR WALL SHEATHING

A. Interior Wall Sheathing (Wall Protection)
   1. Exterior, exposure 1, BC (interior finish B sideout)

2.4 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified
   in this article for material and manufacture.
   1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with
      ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.


D. Wood Screws: ASME B18.6.1.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to
   use with minimum number of joints or optimum joint arrangement. Arrange joints so that
   pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting
   construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:
   1. NES NER-272 for power-driven fasteners.
   2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."

D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

E. Coordinate roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION


B. Fastening Methods: Fasten panels as indicated below:

1. Roof Sheathing:
   a. Nail to wood framing.
   b. Space panels 1/8 inch apart at edges and ends.

END OF SECTION 06160
SECTION 07210 - BUILDING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY
   A. This Section includes the following:
      1. Insulation under slabs-on-grade.
      2. Masonry cell insulation.
      3. Concealed building insulation.
      4. Vapor retarders.

1.3 SUBMITTALS
   A. Product Data: For each type of product indicated.
   B. Samples for Verification: Full-size units for each type of exposed insulation indicated.
   C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulation products.
   D. Research/Evaluation Reports: For foam-plastic insulation.

1.4 QUALITY ASSURANCE
   A. Source Limitations: Obtain each type of building insulation through one source.
   B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect plastic insulation as follows:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Extruded-Polystyrene Board Insulation:
   a. Dow Chemical Company.
   b. Owens Corning.

2. Glass-Fiber Insulation:
   a. CertainTeed Corporation.
   c. Knauf Fiber Glass.
   d. Owens Corning.

3. Foamed-in-Place Insulation:
   a. Polymaster R-501, Polymaster, Inc.

2.2 INSULATING MATERIALS

A. General: Provide insulating materials that comply with requirements and with referenced standards.

1. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths, and lengths.

B. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indices of 75 and 450, respectively:
1. Type IV, 25 psi, unless otherwise indicated.

C. Faced Mineral-Fiber Blanket Insulation: ASTM C 665, Type III (blankets with reflective membrane facing), Class A (membrane-faced surface with a flame spread of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene vapor-retarder membrane on one face; consisting of fibers manufactured from glass.

D. Foamed-In-Place Masonry Cell Insulation:

1. Non-formalin (formaldehyde) non-toxic, odor-free insulation. Two component system consists of an aqueous plastic three polymer resin which, properly combined with the foaming agent and nitrogen or compressed air, forms the plastic foam.
2. The hardening of the liquids is similar to the reaction of epoxy solidifying. The application and manufacturing of this foam does not require or utilize formaldehyde as defined by agencies of the U.S. Government. The hardening time for plastic insulation may be adjusted from 10- to 30 seconds for various applications. Due to superior insulation qualities, final drying will require approximately 48 hours or more.
3. Plastic foam is fully expanded as it leaves the mixing equipment. No future expansion will occur. The lightweight foam is self supporting up to 20 vertical feet.
4. Insulation shall be injected into a cavity through a hole as small as 5/8”. Block walls may be pressure filled with the product.

2.3 INSULATION BAFFLE

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

2. Dow Chemical Company (The).

2.4 VAPOR RETARDERS

A. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 PREPARATION

A. Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

B. Close off openings in cavities receiving poured-in-place insulation to prevent escape of insulation. Provide bronze or stainless-steel screens (inside) where openings must be maintained for drainage or ventilation.

3.3 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice and snow.

C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Water-Piping Coordination: If water piping is located on inside of insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

E. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF PERIMETER AND UNDER-SLAB INSULATION

A. On vertical surfaces, set units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.

1. If not indicated, extend insulation a minimum of 24 inches below exterior grade line.

B. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection board. Set in adhesive according to insulation manufacturer's written instructions.

C. Protect top surface of horizontal insulation from damage during concrete work by applying protection board.

3.5 INSTALLATION OF MASONRY CELL INSULATION

A. All materials shall be delivered to the job site in their original packages bearing the name of the manufacturer and the brand. All materials shall be protected from inclement weather until they are used. The foamed-in-place insulation shall be a three part system, consisting of an aqueous plastic three polymer resin and a catalyst combined with compressed air. When the three parts are combined, a foam insulation material will result. No formaldehyde off-gassing shall be permitted after installation of this project. The key characteristics of the plastic foam must be
that the resins exist in a non-polymerization liquid state during all storage and shipping prior to 24-72 hours of use to ensure maximum quality. Application of the foam shall be made using the manufacturer’s application gun designed exclusively to be used with the specified product. Working pressure of the gun shall be sufficient to fill all voids with the insulating material. During application, all of the materials used to produce the foam shall be maintained at a temperature between 55 degrees and 85 degrees F.

3.6 INSTALLATION OF GENERAL BUILDING INSULATION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Seal joints between closed-cell (nonbreathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.

1. Tape joints and ruptures in vapor retarder and seal each continuous area of insulation to surrounding construction to ensure airtight installation.

D. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:

1. Use blanket widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.

2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

E. For wood-framed construction, install mineral-fiber blankets according to ASTM C 1320 and as follows:

1. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to produce airtight installation after concealing finish material is in place.

3.7 PROTECTION

A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07210
SECTION 07429 - SOFFIT PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes metal soffit panels.
   1. Solid and perforated.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:
   1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
   2. Accessories: Include details of flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.
   1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
   1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.
1.5 CLOSEOUT SUBMITTALS
   A. Maintenance Data: For metal panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE
   A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING
   A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
   B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
   C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
   D. Retain strippable protective covering on metal panels during installation.
   E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.8 FIELD CONDITIONS
   A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.9 COORDINATION
   A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY
   A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
      1. Failures include, but are not limited to, the following:
         a. Structural failures including rupturing, cracking, or puncturing.
         b. Deterioration of metals and other materials beyond normal weathering.
2. Warranty Period: Two (2) years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: Twenty (20) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.
3. Deflection Limits: For wind loads, no greater than 1/180 of the span.

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:

1. Test-Pressure Difference: 1.57 lbf/sq. ft.

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:


D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METAL SOFFIT PANELS

A. General: Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.
B. Flush-Profile Metal Soffit Panels (Flat Soffits #1): Solid & Perforated panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with flush joint between panels. See drawings for location of each type.

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
   a. AEP Span; A BlueScope Steel Company.
   b. Berridge Manufacturing Company.
   c. Firestone Building Products.
   d. MBCI; a division of NCI Group, Inc.

2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
   a. Nominal Thickness: 24 guage thick.

2.3 **MISCELLANEOUS MATERIALS**

A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. **Closure Strips:** Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. **Flashing and Trim:** Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.

D. **Panel Fasteners:** Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. **Panel Sealants:** Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.


2.4 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

   1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
   3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
   4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
   5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
   6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

      a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal soffit panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Steel Panels and Accessories:
   1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

      1. Examine framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal panel manufacturer.
      2. Examine sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal panel manufacturer.

         a. Verify that air- or water-resistive barriers been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

   B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

   C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
   A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 METAL PANEL INSTALLATION
   A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Apply panels and associated items true to line for neat and weathertight enclosure.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

E. Watertight Installation:

1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.
2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.
G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling, and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to achieve waterproof performance.

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07429
SECTION – 07610 – METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 DESCRIPTION

A. General:

1. Furnish all labor, material, tools, equipment, underlayment, flashing, trim and services for all preformed roof as indicated, in accord with provisions of Contract Documents.
2. Completely coordinate with work of all other trades.
3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.

1.3 QUALITY ASSURANCE

A. Applicable standards:


B. Manufacturer’s qualifications:

1. Manufacturer has a minimum of five (5) years’ experience in manufacturing metal roof systems of this nature. Panels specified in this section shall be produced in a factory environment (not job site roll formed) with fixed-base roll forming equipment assuring
the highest level of quality control. A letter from the manufacturer certifying compliance will accompany the product material submittals.

C. Installation contractor’s qualifications:

1. Installation contractor shall be an approved installer, certified by the manufacturer before beginning of installation of the metal roof system, specifically for the specified metal roof system and meet the following minimum criteria:

   a. Has no viable claims pending regarding negligent acts or defective workmanship on previously performed or current projects.
   b. Has not filed for protection from creditors under any state or federal insolvency or debtor relief statutes or codes.
   c. Project foreman is the person having received specific training in the proper installation of the specified metal roof system and will be present to supervise whenever material is being installed.
   d. Provide five references from five different architects or building owners for projects that have been in service for a minimum of two years, stating satisfactory performance by the installation contractor.
   e. Provide certification letter that installation contractor has a minimum of three years’ of metal product installation experience immediately preceding the date upon which work is to commence.

D. Pre-installation Conference:

1. Prior to installation of roofing system, conduct a pre-installation conference at the project site.
2. Attendance: Owner, Architect, Project Superintendent, and/or Roof Applicator.
3. Agenda:
   a. Roofing details and agenda.
   b. Critical work sequencing and review of phasing plan.
   c. Inspection sequencing.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

A. Performance Testing:

1. Metal roof system must be tested in accordance with Underwriters Laboratories, Inc. (UL) Test Method 580 “Tests for Uplift Resistance of Roof Assemblies”.
2. Resist the roof design pressures calculated in accordance with IBC. Determine panel bending and clip-to-panel strength by testing in accordance with ASTM E 1592-95. Capacity for gauge, span or loading other than those tested may be determined by interpolating test results.
3. Metal roof system must meet the air infiltration requirements of ASTM E 1680-95 when tested with a 6.24 PSF pressure differential with resulting air infiltration of 0.0071 cfm/sq ft.
4. Metal roof system must meet the water penetration requirements of ASTM E 1646-95 when tested with a 12.00 PSF pressure differential with no uncontrollable water leakage when five gallons per hour of water is sprayed per square foot of roof area.
1.5 SUBMITTALS

A. Shop drawings:

1. Submit complete shop drawings and erection details, approved by the metal roofing manufacturer, to the architect for review. Do not proceed with manufacture of roofing materials prior to review of shop drawings and field verification of all dimensions. Do not use drawings prepared by the architect for shop or erection drawings.

2. Shop drawings show methods of erection, elevations and plans of roof and wall panels, sections and details, anticipated loads, flashings, roof curbs, vents, sealants, interfaces with all materials not supplied and proposed identification of component parts and their finishes.

B. Samples:

1. Submit metal roof samples and color chips for all proposed finishes.
   a. Submit one 8 inch long sample of panel, including clips.
   b. Submit two 3 inch x 5 inch color chip samples in color selected by the architect (owner).

2. Submit underlayment:
   a. Self-adhering, high temperature sheet.

C. Warranty(s):

1. Metal roof system manufacturer, upon final acceptance for project, furnish a warranty:
   a. Covering panel finish against cracking, checking, blistering, peeling, flaking, chipping, chalking and fading for a period of twenty (20) years for roof panels (premium fluorocarbon coating produced with Kynar 500 or Hylar 5000 resin).
   b. Submit specimen copy of manufacturer’s Weathertightness Warranty, including evidence of application for warranty and manufacturer’s acceptance of applicator and warranty conditions. (See 1.06).

D. Metal roof system fabrication certification:

1. Submit a letter from the metal roof system manufacturer certifying the roof panels have been produced in a factory environment (not job site roll formed) with fixed-base roll forming equipment.

E. Metal roof system installation inspection reports:

1. At completion of project, submit manufacturer’s quality report of field inspections, including final inspection punch list.
F. Installation contractor’s qualifications:

1. Submit certificate from manufacturer certifying that installer of the metal roof system has met all of the criteria outlined in “Installer’s qualifications” and is an authorized installer certified by the manufacturer.
2. Submit five references from five different architects or building owners for projects that have been in service for a minimum of two years, stating satisfactory performance by the installation contractor.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery:

1. Deliver metal roof system to job site properly packaged to provide protection against transportation damage.

B. Handling:

1. Exercise extreme care in unloading, storing and erecting metal roof system to prevent bending, warping, twisting and surface damage.

C. Storage:

1. Store all material and accessories above ground on well skidded platforms. Store under waterproof covering. Provide proper ventilation of metal roof system to prevent condensation build-up between each panel. Do not store panels in contact with other materials that might cause staining, denting or other surface damage.

1.7 WEATHERTIGHTNESS WARRANTY

A. The Contractor shall provide to the Owner, a single source warranty signed by the roofing manufacturer of the Standing Seam Roof System as outlined below:

1. For a period of twenty (20) years from the date of substantial completion, the roofing manufacturer WARRANTS to the Building Owner (“Owner”): that the roofing manufacturer’s furnished roof panels, flashing, and related items used to fasten the roof panels and flashing to the roof structure (“Roof System”) will not allow intrusion of water from the exterior of the roofing manufacturer’s Roof System into the building envelope, when exposed to ordinary weather conditions and ordinary wear and usage. The Date of substantial completion is the date that is certified by the Architect, Owner, or Owner’s Representative, when the roofing manufacturer’s Roofing System is completed and accepted by or on behalf of the Owner.

2. The roofing manufacturer shall have the SOLE AND EXCLUSIVE obligation for all warranty work commencing on the date of substantial completion and under all circumstances, terminates on the 20-year anniversary of the date certified as Substantial Completion of the roofing manufacturer’s Roof System. During the period in which the roofing manufacturer has any warranty obligation, the roofing manufacturer shall take appropriate actions necessary to cause the non-performing portions of the Roof System to perform their proper functions.
B. Roofing Manufacturer’s Liability

1. The total liability of the roofing manufacturer under this warranty is limited solely to two (2) times the cost of the roofing manufacturer’s Roof System as invoiced to the roofing manufacturer’s customer. The roofing manufacturer does not have the right to charge to the liability account, expenses for investigation incurred in satisfying the requirements of this warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURER:

A. Available Manufacturers: Subject to compliance with requirements manufacturers offering products that may be incorporated into the work include, but not limited to, the following:

1. Roof Panel:
   a. MBCI – SuperLok, Houston, TX (281) 445-8555 (double fold).
   b. Pre-approved Substitute meeting these Specifications.

2.2 MATERIALS

A. Metal roof system profile:

1. 2 inch high x 3/4 inch wide rib x 16 inch wide, striated panel.

B. Metal roof system style:

1. Vertical leg, concealed fastener, standing seam, utilizing male and female rib configurations, with factory applied hot-melt mastic in female rib, continuously locked together by an electrically powered mechanical seaming device during installation (double fold).

C. Gauge:

1. 24 gauge.

D. Substrate:

1. Galvalume Plus® steel sheet, minimum yield of 50,000 PSI.

E. Clip:

1. One piece fixed clip, 22 gauge, with factory applied mastic (# UL-90 rated – Underwriters Laboratories).
F. Texture:
   1. Embossed with striations (minimizes oil canning effect).

G. Finish:
   1. Premium fluorocarbon coating produced with Kynar 500 or Hylar 5000 resin (20-year warranty).

H. Color:
   1. Selected from metal roof system manufacturer’s standard offering.

I. Prefabricated Roof Jacks:
   1. Construction Fasteners - Wyomissing, PA.
   2. ITW Buildex - Itasca, IL.

J. Underlayment:
   1. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
      b. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.
      c. Products: Subject to compliance with requirements provide the following: Grace Construction Products, a unit of W.R. Grace & Co.; Ultra.

2.3 MISCELLANEOUS MATERIALS

A. Fasteners:
   1. All self-tapping/self-drilling fasteners, bolts, nuts, self-locking rivets and other suitable fasteners shall be designed to withstand specified design loads.
      a. Use long life fasteners for all interior and exterior metal roof system applications.
      b. Provide fasteners with a factory applied coating in a color to match metal roof system application.
      c. No exposed fasteners allowed.

B. Accessories:
   1. Provide all components required per the metal roof system manufacturer’s approved shop drawings for a complete metal roof system to include panels, panel clips, trim/flashing, fascias, ridge, closures, sealants, fillers and any other required items.
a. All outside closures will be fabricated from Galvalume Plus® sheet steel of the same gauge, finish and color as the panels.
b. All tape seal is to be a pressure sensitive, 100 percent solids, polyisobutylene compound sealing tape with a release paper backing. Provide permanently elastic, non-sagging, non-toxic, non-staining tape seal approved by the metal roof system manufacturer.
c. All joint sealant is to be a one-part elastomeric polyurethane sealant approved by the metal roof system manufacturer.

2.4 FABRICATION

A. Material shall be in-line tension leveled prior to roll forming panel profile.
B. Where possible, roll form panels in continuous lengths, full length of detailed runs.
C. Fabricate trim/flashing and accessories to detailed profiles.
D. Fabricate trim/flashing from same material as panel.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examination:
   1. Inspect installed work of other trades and verify that such work is complete to a point where this work may continue.
   2. Verify that installation may be made in accordance with approved shop drawings and manufacturer’s instructions. This specifically includes verifying that secondary structural members and/or decking are installed to meet UL and building code requirements. Coordinate with metal roof system manufacturer to ensure that reduced clip spacings at eave, rake, ridge and corner areas are accommodated.

B. Discrepancies:
   1. In event of discrepancy, notify the architect.
   2. Do not proceed with installation until discrepancies have been resolved.

3.2 INSTALLATION

A. Install metal roof system so that it is weathertight, without waves, warps, buckles, fastening stresses or distortion, allowing for expansion and contraction.
B. Install metal roof system in accordance with manufacturer’s instructions and shop drawings.
C. Provide concealed anchors at all panel attachment locations.
D. Install panels plumb, level and straight with seams and ribs parallel, conforming to design as indicated. Crimp and roll panel top twice.

3.3 FIELD QUALITY CONTROL

A. Manufacturer’s Field Service

1. During installation, provide one on-site inspection of roof application by a qualified technical representative of the manufacturer during installation.
2. Upon completion of installation, provide a final inspection by a technical representative of roofing manufacturer to confirm that roofing system has been installed in accordance with manufacturer’s requirements.

3.4 CLEANING, PROTECTION

A. Dispose of excess materials and remove debris from site.
B. Clean work in accordance with manufacturer’s recommendations.
C. Protect work against damage until final acceptance. Replace or repair to the satisfaction of the architect (owner), any work that becomes damaged prior to final acceptance.
D. Touch up minor scratches and abrasions with touch up paint supplied by the metal roof system manufacturer.

END OF SECTION 07610
SECTION 07620 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
A. Section Includes:
   1. Formed roof-drainage sheet metal fabrications.
      a. Gutters
      b. Downspout.
      c. Concrete splash block.
   2. Formed low-slope roof sheet metal fabrications.
      a. Fascia.

1.3 COORDINATION
A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS
A. Preinstallation Conference: Conduct conference at project site.
   1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
   3. Review requirements for insurance and certificates if applicable.
   4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.5 ACTION SUBMITTALS
A. Product Data: For each type of product.
1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: For sheet metal flashing and trim.
1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
10. Include details of special conditions.
11. Include details of connections to adjoining work.
12. Detail formed flashing and trim at scale of not less than 3 inches per 12 inches (1:5).

C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

D. Samples for Verification: For each type of exposed finish.
1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.

1.6 QUALITY ASSURANCE
A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1.7 DELIVERY, STORAGE, AND HANDLING
A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.
1.8 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

1. Exposed Coil-Coated Finish:
   a. Three-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Color: As selected by Architect from manufacturer's full range.
3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.

2.3 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226/D 226M, Type II (No. 15), asphalt-saturated organic felt; nonperforated.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
   a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
   b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

2.5 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
2. Obtain field measurements for accurate fit before shop fabrication.
3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.

4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

D. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges (coping), not less than 1 inch deep, filled with butyl sealant concealed within joints.

2. (Fascia): Use lapped expansion joints only where indicated on Drawings.

E. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

G. Do not use graphite pencils to mark metal surfaces.

2.6 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch long sections. Furnish flat-stock gutter straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard but with thickness not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers and gutter accessories from same metal as gutters.

1. Gutter Profile: As indicated.

2. Expansion Joints: Butt type with cover plate.

3. Gutters Material: Fabricate from the following materials:

   a. 24 ga. pre-finished as indicated.

B. Downspout: Fabricate rectangular downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from same material

1. Manufactured Hanger Style: Fig 1-34I according to SMACNA's "Architectural Sheet Metal Manual."

2. Fabricate from same materials as gutter.

C. Splash Pans: Concrete.
2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Fascia: Fabricate in minimum 96-inch-long, but not exceeding 12-foot-long sections. Shop fabricate interior and exterior corners.

2. Fabricate from the Following Materials:
   a. Prefinished steel, 24 gauge.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.

   1. Verify compliance with requirements for installation tolerances of substrates.
   2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
   3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

3.3 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

   1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
   2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
   3. Anchor continuous cleats not more than 12 inches on center.
   4. Install exposed sheet metal flashing and trim without oil canning, and free of buckling and tool marks.
   5. Torch cutting of sheet metal flashing and trim is not permitted.
6. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.

3.4 ROOF-DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Hanging Gutters: Join sections with joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.

1. Anchor gutter with straps spaced not more than 24 inches apart to roof deck, unless otherwise indicated, and loosely lock to front gutter bead.

2. Install gutter with expansion joints at locations not exceeding, 50 feet apart. Install expansion-joint caps.

C. Downspout: (24 ga. pre-finished steel)
1. Provide hangers with fasteners designed to hold downspouts securely to gutter and walls. Locate hangers at top and bottom and at approximately 60 inches o.c.

D. Splash Blocks: Install concrete splash blocks where downspouts discharge at low-slope roofs.

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8- inch offset of adjoining faces and of alignment of matching profiles.

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean off excess sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer’s written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07620
SECTION 08110 - STEEL DOOR AND FRAME

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary
      Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
   A. Section includes hollow-metal work.
   B. Related Requirements:
      1. Section 08710 "Door Hardware" for door hardware for hollow-metal doors.

1.3 DEFINITIONS
   A. Minimum Thickness: Minimum thickness of base metal without coatings according to
      NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION
   A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings,
      templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor
      bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 PREINSTALLATION MEETINGS
   A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Shop Drawings: Include the following:
      1. Elevations of each door type.
      2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
      3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
      4. Locations of reinforcement and preparations for hardware.
      5. Details of each different wall opening condition.
      6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

   1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

   1. Steelcraft; an Ingersoll-Rand company or pre-approved equal.

B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 INTERIOR DOORS AND FRAMES

   1. Frames:

      a. Materials: Uncoated and Metallic-coated, steel sheet, minimum thickness of 0.067 inch.
      b. Construction: Full profile welded.


2.3 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.


   1. Physical Performance: Level A according to SDI A250.4.
   2. Doors:
a. **Type:** As indicated in the Door and Frame Schedule.
b. **Thickness:** 1-3/4 inches.
c. **Face:** Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
d. **Edge Construction:** Model 2, Seamless and factory welded.
e. **Core:** Manufacturer's standard, mineral-board and vertical steel-stiffener core.
f. **Fire Rated Core:** Manufacturer’s standard vertical steel stiffener and laminated mineral board core for fire rating (90 min.)

2.4 FRAME ANCHORS

A. **Jamb Anchors:**

1. **Type:** Anchors of minimum size and type required by applicable door and frame standard and suitable for performance level indicated.
2. **Quantity:** Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
3. **Postinstalled Expansion Anchor:** Minimum 3/8-inch diameter bolts with expansion shields or inserts, with manufacturer’s standard pipe spacer.

B. **Floor Anchors:** Provide floor anchors for each jamb and mullion that extends to floor.

C. **Floor Anchors for Concrete Slabs with Underlayment:** Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at top of underlayment.

D. **Material:** ASTM A879/A879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized according to ASTM A153/A153M, Class B.

2.5 MATERIALS

A. **Cold-Rolled Steel Sheet:** ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. **Frame Anchors:** ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

C. **Inserts, Bolts, and Fasteners:** Hot-dip galvanized according to ASTM A 153/A 153M.
D. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

E. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

F. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

G. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.6 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. **Steel-Stiffened Door Cores**: Provide minimum thickness 0.026 inch, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches apart. Spot weld to face sheets no more than 5 inches o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.


3. Top Edge Closures: Close top edges of doors with inverted closures, except provide flush closures at exterior doors of same material as face sheets.

4. Bottom Edge Closures: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets.

5. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.

3. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.

4. Jamb Anchors: Provide number and spacing of anchors as follows:
a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:

1) Three anchors per jamb from 60 to 90 inches high.

5. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.

6. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.

7. Terminated Stops: Terminate stops 6 inches above finish floor with a 45-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.

D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

2.7 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.8 ACCESSORIES

A. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HIMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

   a. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
   b. Install frames with removable stops located on secure side of opening.
   c. Install door silencers in frames before grouting.
   d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
   e. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
   f. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

   a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
4. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

   a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
   c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

   1. Non-Fire-Rated Steel Doors:

      a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
      b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
      c. At Bottom of Door: 3/4 inch plus or minus 1/32 inch.
      d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 08110
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes electrically operated sectional doors.

1. New door and track.
2. Re-install existing operators.

B. Related Sections:

1. Section 09911 "Exterior Painting" and Section 09912 "Interior Painting" for finish painting of factory-primed doors.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Sectional doors shall meet performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.

B. Delegated Design: Design sectional doors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Structural Performance: Exterior sectional doors shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Wind Loads: Uniform pressure (velocity pressure) of 20 lb/sq. ft., acting inward and outward.
   a. Basic Wind Speed: 90 mph.

2. Deflection Limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components. Deflection of door in horizontal position (open) shall not exceed 1/120 of the door width.

D. Air Infiltration: Maximum rate not more than indicated when tested according to ASTM E 283 or DASMA 105.
E. Windborne-Debris-Impact-Resistance Performance: Provide glazed sectional doors that pass large-missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and ASTM E 1996.

F. Seismic Performance: Sectional doors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
2. Seismic Component Importance Factor: 1.5.

G. Operation Cycles: Provide sectional door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1.4 ACTION SUBMITTALS

A. Product Data: For each type and size of sectional door and accessory. Include the following:

1. Construction details, material descriptions, dimensions of individual components, profile door sections, and finishes.
2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

1. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Flat Door Sections: 6 inches square.

E. Delegated-Design Submittal: For sectional doors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of seismic restraints.
2. Summary of forces and loads on walls and jambs.
1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sectional doors to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

B. Source Limitations: Obtain sectional doors from single source from single manufacturer.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Standard for Sectional Doors: Fabricate sectional doors to comply with DASMA 102 unless otherwise indicated.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures including, but not limited to, excessive deflection.
   b. Faulty operation of hardware.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.
   d. Delamination of exterior or interior facing materials.

2. Warranty Period: Five years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 STEEL DOOR SECTIONS

A. Exterior Section Faces and Frames: Fabricate from zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M, with indicated zinc coating and thickness.
1. Fabricate section faces from single sheets to provide sections not more than 24 inches high and of indicated thickness. Roll horizontal meeting edges to a continuous, interlocking, keyed, rabbeted, shiplap, or tongue-in-groove weathertight seal, with a reinforcing flange return.

2. For insulated doors, provide sections with continuous thermal-break construction, separating the exterior and interior faces of door.

B. Section Ends and Intermediate Stiles: Enclose open ends of sections with channel end stiles formed from galvanized-steel sheet not less than 0.064-inch-nominal coated thickness and welded to door section. Provide intermediate stiles formed from not less than 0.064-inch-thick galvanized-steel sheet, cut to door section profile, and welded in place. Space stiles not more than 48 inches apart.

C. Reinforce bottom section with a continuous channel or angle conforming to bottom-section profile.

D. Reinforce sections with continuous horizontal and diagonal reinforcement, as required to stiffen door and for wind loading. Provide galvanized-steel bars, struts, trusses, or strip steel, formed to depth and bolted or welded in place. Ensure that reinforcement does not obstruct vision lites.

E. Provide reinforcement for hardware attachment.

F. Foamed-in-Place Thermal Insulation: Insulate interior of steel sections with door manufacturer's standard CFC-free polyurethane insulation, foamed in place to completely fill interior of section and pressure bonded to face sheets to prevent delamination under wind load, and with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within steel sections that incorporate the following interior facing material, with no exposed insulation:

1. Interior Facing Material: Zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M, with indicated thickness.

G. Fabricate sections so finished door assembly is rigid and aligned, with tight hairline joints and free of warp, twist, and deformation.

2.2 TRACKS, SUPPORTS, AND ACCESSORIES

A. Tracks: Manufacturer's standard, galvanized-steel 3” track system of configuration indicated designed for lift type indicated and clearances shown on Drawings, and complying with ASTM A 653/A 653M for minimum G60 (Z180) zinc coating. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slot vertical sections of track spaced 2 inches apart for door-drop safety device. Slope tracks at proper angle from vertical or design tracks to ensure tight closure at jambs when door unit is closed.

B. Track Reinforcement and Supports: Galvanized-steel track reinforcement and support members, complying with ASTM A 36/A 36M and ASTM A 123/A 123M. Secure, reinforce, and support tracks as required for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors.
1. Vertical Track Assembly: Track with continuous reinforcing angle attached to track and attached to wall with jamb brackets.

2. Horizontal Track Assembly: Track with continuous reinforcing angle attached to track and supported at points from curve in track to end of track by laterally braced attachments to overhead structural members.

C. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of sectional door unless otherwise indicated.

D. Windows: Manufacturer's standard window units of type and size indicated and in arrangement shown. Set glazing in vinyl, rubber, or neoprene glazing channel for metal-framed doors and elastic glazing compound for wood doors, as required. Provide removable stops of same material as door-section frames.

2.3 HARDWARE

A. General: Provide heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.

B. Hinges: Heavy-duty, galvanized-steel hinges of not less than 0.079-inch- nominal coated thickness at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible. Provide double-end hinges where required, for doors over 16 feet wide unless otherwise recommended by door manufacturer.

C. Rollers: Heavy-duty rollers with steel ball-bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide 3-inch- diameter roller tires for 3-inch- wide track and 2-inch- diameter roller tires for 2-inch- wide track.

D. Push/Pull Handles: For push-up or emergency-operated doors, provide galvanized-steel lifting handles on each side of door.

2.4 LOCKING DEVICES

A. Locking Device Assembly: Fabricate with cylinder lock in exterior 3 button operation station.

1. Lock Cylinders: Provide enclosure box to receive Owner-supplied cylinders and keyed to building keying system.

2. Keys: Three for each cylinder.

B. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.
2.5 COUNTERBALANCE MECHANISM

A. Torsion Spring: Counterbalance mechanism consisting of adjustable-tension torsion springs fabricated from steel-spring wire complying with ASTM A 229/A 229M, mounted on torsion shaft made of steel tube or solid steel. Provide springs designed for number of operation cycles indicated.

B. Weight Counterbalance: Counterbalance mechanism consisting of filled pipe weights that move vertically in a galvanized-steel weight pipe. Connect pipe weights with cable to weight-cable drums mounted on torsion shaft made of steel tube or solid steel.

C. Cable Drums and Shaft for Doors: Cast-aluminum or gray-iron casting cable drums mounted on torsion shaft and grooved to receive door-lifting cables as door is raised. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of torsion shaft. Provide one additional midpoint bracket for shafts up to 16 feet long and two additional brackets at one-third points to support shafts more than 16 feet long unless closer spacing is recommended by door manufacturer.

D. Cables: Galvanized-steel lifting cables with cable safety factor of at least 7 to 1.

E. Cable Safety Device: Include a spring-loaded steel or spring-loaded bronze cam mounted to bottom door roller assembly on each side and designed to automatically stop door if either lifting cable breaks.

F. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level the shaft and prevent sag.

G. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

H. hand chain with chain holder secured to operator guide.

2.6 ELECTRIC DOOR OPERATORS (RE-INSTALL EXISTING OPERATORS)

A. General: Review existing operators prior to bidding to ensure new doors will work with existing doors. Make all connections as required for fully functioning operation.

2.7 DOOR ASSEMBLY

A. Steel Sectional Door: Sectional door formed with hinged sections.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:

   b. Pre-approved substitution prior to bid.

B. Installed R-Value: 14.86 U-.067.

C. Steel Sections: Zinc-coated (galvanized) steel sheet with G60 zinc coating.
2. Exterior-Face, Steel Sheet Thickness: .016 inches nominal coated thickness.
   a. Surface: Flat.
3. Insulation: Foamed in place.
4. Interior Facing Material: Zinc-coated (galvanized) steel sheet of manufacturer's recommended thickness to meet performance requirements nominal coated thickness.

D. Track Configuration: Low-headroom.

E. Weatherseals: Fitted to bottom and top and around entire perimeter of door.

F. Windows: Approximately 24 by 7 inches with curved corners and spaced apart the approximate distance as indicated on Drawings; in one row at height indicated on Drawings; installed with insulated glazing of the following type:
   1. Insulating Glass: Manufacturer's standard.

G. Roller-Tire Material: Manufacturer's standard.

H. Counterbalance Type: Manufacturer’s standard.

I. Electric Door Operator:
   1. Re-install existing.

J. Door Finish:
   1. Baked-Enamel or Powder-Coated Finish: Color and gloss as selected by Architect from manufacturer's full range.
   2. Finish of Interior Facing Material: Match finish of exterior section face.

2.8 GENERAL FINISH REQUIREMENTS

A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.9 STEEL AND GALVANIZED-STEEL FINISHES

A. Baked-Enamel or Powder-Coated Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine existing electric operators prior to bid.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install sectional doors connected to the existing operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Tracks:
   1. Fasten vertical track assembly to opening jambs and framing, spaced not more than 24 inches apart.
   2. Hang horizontal track assembly from structural overhead framing with angles or channel hangers attached to framing by welding or bolting, or both. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.
   3. Repair galvanized coating on tracks according to ASTM A 780.

3.3 STARTUP SERVICES

A. Engage a factory-authorized service representative to perform startup service.

   1. Complete installation and startup checks according to manufacturer's written instructions.
   2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust doors and seals to provide weathertight fit around entire perimeter.

D. Align and adjust motors, pulleys, belts, sprockets, chains, and controls according to manufacturer's written instructions.
E. Touch-up Painting: Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A 780.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional doors.

END OF SECTION 08361
SECTION 08531 - VINYL WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes vinyl-framed windows.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for vinyl windows.
   2. Provide published literature indicating compliance with Energy Star for project climate zone.

B. Samples: For each exposed product and for each color specified, 2 by 4 inches (50 by 100 mm) in size.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of vinyl window, for tests performed by a qualified testing agency.

B. Sample Warranties: For manufacturer's warranties.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating vinyl windows that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.

B. Installer Qualifications: An installer acceptable to vinyl window manufacturer for installation of units required for this Project.
1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace vinyl windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Failure to meet performance requirements.
   b. Structural failures including excessive deflection, water leakage, and air infiltration.
   c. Faulty operation of movable sash and hardware.
   d. Deterioration of materials and finishes beyond normal weathering.
   e. Failure of insulating glass.

2. Warranty Period:
   a. Window: 10 years from date of Substantial Completion.
   b. Glazing Units: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain vinyl windows from single source from single manufacturer.

B. Manufacturers: Basis of Design: Alside Series 70. Subject to compliance with requirements, available manufacturer's offering products that may be incorporated into the work include, but are not limited to the following:

   1. Alside
   2. Amsco
   3. Cascade
   4. Georgia Pacific
   5. Gerkin
   6. Insulate
   7. Jeld-Wen
   8. Millgard
   9. Thermo-Tech
   10. Vinylite
   11. Winterseal

2.2 WINDOW PERFORMANCE REQUIREMENTS

A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

   1. Window Certification: WDMA certified with label attached to each window.
B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
   1. Minimum Performance Class: R.

C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.27 Btu/sq. ft. x h x
deg F (1.71 W/sq. m x K) Energy Star Certified for Northern Climate Zone.

D. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.40.

2.3 VINYL WINDOWS

A. Operating Types: Provide the following operating types in locations indicated on Drawings:
   1. Horizontal sliding.

B. Frames and Sashes: Impact-resistant, UV-stabilized PVC complying with
   1. Finish: Integral color, beige or sandstone, as selected by Owner.
   2. Gypsum Board Returns and Simulate Marble Sills: Provide at interior face of frame.

C. Insulating-Glass Units: ASTM E2190.
   1. Glass: ASTM C1036, Type I, Class 1, q3.
      a. Tint: Clear.
      b. Kind: Fully tempered where indicated on Drawings or required by Code.

D. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum,
stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material
compatible with adjacent materials; designed to smoothly operate, tightly close, and securely
lock windows, and sized to accommodate sash weight and dimensions.
   1. Exposed Hardware Color and Finish: Manufacturer’s Standard Finish to match color of
      frame.

E. Horizontal-Sliding Window Hardware:
   1. Sill Cap/Track: Extruded-aluminum track with natural anodized finish, Rigid PVC or
      other weather-resistant plastic track with manufacturer's standard integral color of
dimensions and profile indicated; designed to comply with performance requirements
indicated and to drain to the exterior.
   2. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in
direction indicated and operated from the inside only. Provide custodial locks.
   3. Roller Assemblies: Low-friction design.

F. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless
otherwise indicated.
G. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
   1. Exposed Fasteners: Do not use exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.4 INSECT SCREENS

A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.
   1. Type and Location: Half, outside for sliding sashes.

B. Aluminum Frames: Manufacturer's standard aluminum alloy complying with SMA 1004 or SMA 1201. Fabricate frames with mitered or cope joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.
   1. Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet.

C. Glass-Fiber Mesh Fabric: 18-by-14 mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration. Comply with ASTM D 3656/D 3656M.
   1. Mesh Color: Manufacturer's standard.

2.5 FABRICATION

A. Fabricate vinyl windows in sizes indicated. Include a complete system for installing and anchoring windows.

B. Glaze vinyl windows in the factory.

C. Weather strip each operable sash to provide weathertight installation.

D. Hardware: Mount hardware through double walls of vinyl extrusions or provide corrosion-resistant reinforcement.

E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.
PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.

C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weather-tight window installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION
A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.

B. Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weather-tight construction.

3.3 ADJUSTING, CLEANING, AND PROTECTION
A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weather-tight closure.

B. Clean exposed surfaces immediately after installing windows. Remove excess sealants, glazing materials, dirt, and other substances.

1. Keep protective films and coverings in place until final cleaning.

C. Remove and replace sashes if glass has been broken, chipped, cracked, abraded, or damaged during construction period.

D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 08531
SECTION 08710 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary
   Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

   1. Mechanical door hardware for the following:

      a. Swinging doors.
      b. Overhead door (cyl). (Owner-supplied.)

B. Related Sections:

   1. Section 08110 "Steel Doors and Frames" for door silencers provided as part of hollow-
      metal frames.

C. Products furnished by Owner and installed by Owner.

   1. Permanent lock cores.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction and installation details,
   material descriptions, dimensions of individual components and profiles, and finishes.

B. Other Action Submittals:

   1. Door Hardware Schedule: Prepared by or under the supervision of a DHI Certified
      Architectural Hardware Consultant, detailing fabrication and assembly of door hardware,
      as well as installation procedures and diagrams. Coordinate final door hardware schedule
      with doors, frames, and related work to ensure proper size, thickness, hand, function, and
      finish of door hardware.

      a. Submittal Sequence: Submit door hardware schedule concurrent with submissions
         of Product Data, Samples, and Shop Drawings. Coordinate submission of door
         hardware schedule with scheduling requirements of other work to facilitate the
         fabrication of other work that is critical in Project construction schedule.

      b. Format: Comply with scheduling sequence and vertical format in DHI's
         "Sequence and Format for the Hardware Schedule." Double space entries, and
         number and date each page.
c. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.

d. Content: Include the following information:

1) Identification number, location, hand, fire rating, size, and material of each door and frame.
2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
4) Fastenings and other pertinent information.
5) Explanation of abbreviations, symbols, and codes contained in schedule.
6) Mounting locations for door hardware.
7) List of related door devices specified in other Sections for each door and frame.

2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.

1.5 QUALITY ASSURANCE

A. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as follows:

1. For door hardware, an Architectural Hardware Consultant (AHC).

B. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

C. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1

D. Keying Conference: Conduct conference at location required by ITD. In addition to Owner, Contractor, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system.

E. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Inspect and discuss preparatory work performed by other trades.
1.6 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

D. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.7 COORDINATION

A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures including excessive deflection, cracking, or breakage.
   b. Faulty operation of doors and door hardware.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.
   a. Exit Devices: Two years from date of Substantial Completion.
   b. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" to comply with requirements in this Section.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.
B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.
2. References to BHMA Designations: Provide products complying with these designations and requirements for description, quality, and function.

2.2 KEYING (BY OWNER)

   1. Master Key System: Change keys and a master key operate cylinders.
   2. Existing System:
      a. Master key or grand master key locks to Owner's existing system.
      b. Re-key Owner's existing master key system into new keying system.
   3. Keyed Alike: Key all cylinders to same change key.

B. Keys: Nickel silver.
   1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
      a. Notation: "DO NOT DUPLICATE."
   2. Quantity: In addition to one extra key blank for each lock, provide the following:
      b. Master Keys: Five.

2.3 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.
   1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not
permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.

2. Fire-Rated Applications:
   a. Wood or Machine Screws: For the following:
      1) Hinges mortised to doors or frames.
      2) Strike plates to frames.
      3) Closers to doors and frames.
   b. Steel Through Bolts: For the following unless door blocking is provided:
      1) Surface hinges to doors.
      2) Closers to doors and frames.
      3) Surface-mounted exit devices.

3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.

2.4 FINISHES
   A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
   B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
   C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
   B. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 PREPARATION

A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.


B. Install each door hardware item to comply with manufacturer's 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. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores supplied by Owner.
2. Owner will supply permanent cores and Owner will install.

E. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

F. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant.

G. Stops: Provide floor stops for doors.

H. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

I. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 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.

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.5 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.
### 3.6 DOOR HARDWARE SCHEDULE

#### HW SET NO: 01
**DOOR NUMBER:** (INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING DOORS)
5 6 7 8

**EACH TO HAVE:**
- 1 EA CYL AS REQ'D MATCH EXISTING CYLINDER BES
- HARDWARE BY DOOR MFG B/O

#### HW SET NO: 02
**DOOR NUMBER:** (INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING DOORS)
3 4

**EACH TO HAVE:**
- 6 EA HINGE 5BB1 4.5 X 4.5 NRP 639 IVE
- 1 SET AUTO FLUSH BOLT FB31P 612 IVE
- 1 EA DUST PROOF STRIKE DP2 612 IVE
- 1 EA OFF/ENT LOCK 93K7AB 15D S3 612 BES
- 1 EA COORDINATOR COR X FL 711 IVE
- 2 EA MOUNTING BRACKET MB BLK IVE
- 1 EA CARRYBAR CB1 691 IVE
- 2 EA SURFACE CLOSER 4040XP EDA 691 LCN
- 2 EA KICK PLATE 8400 10" X 2" LDW B-CS 612 IVE
- 2 EA WALL STOP WS401/402CVX 612 IVE
- 1 EA GASKETING 429BK-S BK ZER
- 1 EA ASTRAGAL BY DOOR MFG B/O
- 2 EA DOOR SWEEP 39D D ZER
- 1 EA THRESHOLD 655D-223 D ZER

#### HW SET NO: 03
**DOOR NUMBER:** (INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING DOORS)
1 2

**EACH TO HAVE:**
- 3 EA HINGE 5BB1 4.5 X 4.5 NRP 639 IVE
- 1 EA OFF/ENT LOCK 93K7AB 15D S3 612 BES
- 1 EA SURFACE CLOSER 4111 AVB SCUSH MC 691 LCN
- 1 EA CUSH SHOE SUPPORT 4110-30 691 LCN
- 1 EA KICK PLATE 8400 10" X 2" LDW B-CS 612 IVE
- 1 EA GASKETING 429BK-S BK ZER
- 1 EA DOOR SWEEP 39D D ZER
- 1 EA THRESHOLD 655D-223 D ZER
HW SET NO: 04
DOOR NUMBER: (INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING DOORS)
E4

EACH TO HAVE:
3 EA HINGE 5BB1 4.5 X 4.5 NRP 639 IVE
1 EA PRIVACY LATCH 93K0L 15D S3 612 BES
1 EA OH STOP 908 J 612 GLY
1 EA KICK PLATE 8400 10" X 2" LDW B-CS 612 IVE
1 EA GASKETING 488FSBK PSA BK ZER
1 EA COAT AND HAT HOOK 507 619 IVE

HW SET NO: 05
DOOR NUMBER: (INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING DOORS)
E3 E5 E6

EACH TO HAVE:
3 EA HINGE 5BB1 4.5 X 4.5 NRP 639 IVE
1 EA OFF/ENT LOCK 93K7AB 15D S3 612 BES
1 EA KICK PLATE 8400 10" X 2" LDW B-CS 612 IVE
1 EA WALL STOP WS401/402CVX 612 IVE
3 EA SILENCER SR64 GY IVE

HW SET NO: 06
DOOR NUMBER: (INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING DOORS)
E1 E2

EACH TO HAVE:
RE-USE EXISTING HARDWARE EXI

PATCH, REPAIR, REFINISH DOOR AND FRAME AS REQUIRED. REPLACE ANY HARDWARE IF DAMAGED.

END OF SECTION 08710
SECTION 09221 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Non-load-bearing steel framing systems for interior partitions.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association the Steel Framing Industry Association or the Steel Stud Manufacturers Association.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.

B. Horizontal Deflection: For wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lbf/sq. ft.

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

   1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.

B. Studs and Tracks: ASTM C 645. Use either steel studs and tracks or embossed steel studs and tracks.

1. Steel Studs and Tracks:
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1) CEMCO; California Expanded Metal Products Co.
      2) Custom Stud.
      3) Jaimes Industries.
      4) MarinoWARE.
      5) MBA Building Supplies.
      6) MRI Steel Framing, LLC.
      7) Phillips Manufacturing Co.
      8) SCAFCO Steel Stud Company.
      9) Steel Construction Systems.
      10) Steel Network, Inc. (The).
      11) Telling Industries.
   b. Minimum Base-Metal Thickness: As indicated on drawings
   c. Depth: As indicated on drawings.

C. Slip-Type Head Joints: Where indicated, provide the following:

1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing minimum vertical movement.
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1) CEMCO; California Expanded Metal Products Co.
      2) ClarkDietrich Building Systems.
      3) Fire Trak Corp.
      4) MarinoWARE.
      5) SCAFCO Steel Stud Company.
      6) Steel Construction Systems.
      7) Steel Network, Inc. (The).
      8) Super Stud Building Products Inc.

2.3 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide the following:
1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

D. Install bracing at terminations in assemblies.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.3 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.


B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
1. **Door Openings:** Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
   a. Install two studs at each jamb unless otherwise indicated.
   b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
   c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

2. **Other Framed Openings:** Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

E. **Installation Tolerance:** Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION 09221
SECTION 09290 GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
A. Section Includes:
   1. Interior gypsum board.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.

1.4 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.

1.5 FIELD CONDITIONS
A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
C. Do not install panels that are wet, moisture damaged, and mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.
PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard: ASTM C 1396/C 1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. American Gypsum.
   b. CertainTeed Corporation.
   c. Continental Building Products, LLC.
   d. Georgia-Pacific Gypsum LLC.
   e. National Gypsum Company.
   f. PABCO Gypsum.
   g. USG Corporation.

2. Thickness: 5/8” (type x typical)

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. American Gypsum.
   b. CertainTeed Corporation.
   c. Continental Building Products, LLC.
   d. Georgia-Pacific Gypsum LLC.
   e. National Gypsum Company.
   f. PABCO Gypsum.
   g. USG Corporation.

C. Impact-Resistant Gypsum Board: ASTM C 1396/C 1396M gypsum board, tested according to ASTM C 1629/C 1629M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. American Gypsum.
   b. CertainTeed Corporation.
   c. Continental Building Products, LLC.
   d. Georgia-Pacific Gypsum LLC.
   e. National Gypsum Company.
   f. PABCO Gypsum.
   g. USG Corporation.

2. Core: As indicated on Drawings 5/8 inch, Type X.
3. Surface Abrasion: ASTM C 1629/C 1629M, meets or exceeds Level 2 requirements.

2.4 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:
   1. Interior Gypsum Board: Paper.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
   1. Prefilling: At open joints, beveled panel edges and damaged surface areas, use setting-type taping compound.
   2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners and trim flanges, use drying-type, all-purpose compound.
      a. Use setting-type compound for installing paper-faced metal trim accessories.
   3. Fill Coat: For second coat, use drying-type, all-purpose compound.
   4. Finish Coat: For third coat, use drying-type, all-purpose compound.
   5. Skim Coat: For final coat of Level 5 finish, use high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

2.5 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
   1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch.
C. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

C. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

D. Form control and expansion joints with space between edges of adjoining gypsum panels.

E. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
   1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
   2. Fit gypsum panels around ducts, pipes, and conduits.
   3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.

F. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

G. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

H. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber,
including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Wallboard Type: As indicated on Drawings.
2. Type X: As indicated on Drawings.
3. Impact-Resistant Type: As indicated on Drawings.

B. Single-Layer Application:

1. On partitions/walls, apply gypsum panels vertically unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
   a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
   b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

2. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.

2. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

3.4 INSTALLING TRIM ACCESSORIES

A. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

B. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners unless otherwise indicated.
2. Bullnose Bead: Use at outside corners.
3. L-Bead: Use where indicated.

3.5 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
B. Prefill open joints, beveled edges and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
   1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
   2. Level 5:
      a. Primer and its application to surfaces are specified in Section 09912 "Interior Painting."

3.6 1811PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09290
SECTION 09911 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary
   Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes surface preparation and the application of paint systems on the following
   exterior substrates:

   1. Steel including but not limited to doors, frames, bollards, CMU and other items indicated.

B. Related Sections include the following:

   1. Division 9 Section "Interior Painting" for surface preparation and the application of paint
      systems on interior substrates.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of topcoat product indicated.

C. Samples for Verification: For each type of paint system and each color and gloss of topcoat
   indicated.

   1. Submit Samples on rigid backing, 8 inches square.
   2. Step coats on Samples to show each coat required for system.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

   1. Cross-reference to paint system and locations of application areas. Use same
      designations indicated in schedules.
   2. Printout of current "MPI Approved Products List" for each product category specified in
      Part 2, with the proposed product highlighted.

1.4 QUALITY ASSURANCE

A. MPI Standards:
1. **Products:** Complying with MPI standards indicated and listed in "MPI Approved Products List."

2. **Preparation and Workmanship:** Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

B. **Mockups:** Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

   1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
      
      a. **Vertical and Horizontal Surfaces:** Provide samples of at least 100 sq. ft.
      
      b. **Other Items:** Architect will designate items or areas required.

   2. Final approval of color selections will be based on benchmark samples.
      
      a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.5 **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.

   1. Maintain containers in clean condition, free of foreign materials and residue.
   
   2. Remove rags and waste from storage areas daily.

1.6 **PROJECT CONDITIONS**

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.7 **EXTRA MATERIALS**

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

   1. Quantity: Furnish an additional 1 new and full unopened gallon of each material and color applied.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include manufacturers that meet and have MP1 certification as specified.

2.2 PAINT, GENERAL

A. Material Compatibility:
   1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

C. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

   1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
   1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

D. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions.
   1. Spray steel doors and frames.
   2. Spray and back roll CMU.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:
   1. Owner may engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
   2. Testing agency will perform tests for compliance of paint materials with product requirements.
   3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.
3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Steel Substrates:

B. CMU Substrates:
   1. Latex System
      c. Topcoat: Latex, exterior, low sheen (Gloss Level 3), MPI #15.

END OF SECTION 09911
SECTION 09912 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Concrete masonry units (CMU).
2. Steel.
4. Wood.

B. Related Sections include the following:

1. Division 9 Section "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.
2. Division 3 Section “Concrete For Concrete Slab Sealer.”

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of topcoat product indicated.

C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inchesquare.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.
1.4 QUALITY ASSURANCE

A. MPI Standards:
   1. Products: Complying with MPI standards indicated and listed in "MPI Approved
      Products List."
   2. Preparation and Workmanship: Comply with requirements in "MPI Architectural
      Painting Specification Manual" for products and paint systems indicated.

B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish
   selected to verify preliminary selections made under sample submittals and to demonstrate
   aesthetic effects and set quality standards for materials and execution.
   1. Architect will select one surface to represent surfaces and conditions for application of
      each paint system specified in Part 3.
      a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft..
      b. Other Items: Architect will designate items or areas required.
   2. Apply benchmark samples after permanent lighting and other environmental services
      have been activated.
   3. Final approval of color selections will be based on benchmark samples.
      a. If preliminary color selections are not approved, apply additional benchmark
         samples of additional colors selected by Architect at no added cost to Owner.

1.5 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.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are
   between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than
   5 deg F above the dew point; or to damp or wet surfaces.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as
   materials applied and that are packaged for storage and identified with labels describing
   contents.
1. Quantity: Furnish an additional 1 new and full unopened gallon of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include manufacturers that have and comply with the MPI certification.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
4. Floor Coatings: VOC not more than 100 g/L.
5. Flat Topcoat Paints: VOC content of not more than 50 g/L.
6. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.
7. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
8. Floor Coatings: VOC not more than 100 g/L.
9. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
10. Dry-Fog Coatings: VOC content of not more than 400 g/L.
11. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 340 g/L.
12. Pre-Treatment Wash Primers: VOC content of not more than 420 g/L.

C. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).

2. Restricted Components: Paints and coatings shall not contain any of the following:

   a. Acrolein.
   b. Acrylonitrile.
   c. Antimony.
   d. Benzene.
   e. Butyl benzyl phthalate.
   f. Cadmium.
   g. Di (2-ethylhexyl) phthalate.
   h. Di-n-butyl phthalate.
   i. Di-n-octyl phthalate.
   j. 1,2-dichlorobenzene.
   k. Diethyl phthalate.
   l. Dimethyl phthalate.
   m. Ethylbenzene.
   n. Formaldehyde.
   o. Hexavalent chromium.
   p. Isophorone.
   q. Lead.
   r. Mercury.
   s. Methyl ethyl ketone.
   t. Methyl isobutyl ketone.
   u. Methylene chloride.
   v. Naphthalene.
   w. Toluene (methylbenzene).
   x. 1,1,1-trichloroethane.
   y. Vinyl chloride.

D. Colors: As selected by Architect from manufacturer's full range.

2.3 BLOCK FILLERS

2.4 PRIMERS/SEALERS
A. Interior Latex Primer/Sealer: MPI #50.
   1. VOC Content: E Range of E3.
B. Interior Alkyd Primer/Sealer: MPI #45.

2.5 METAL PRIMERS
A. Alkyd Anticorrosive Metal Primer: MPI #79.
B. Quick-Drying Alkyd Metal Primer: MPI #76.

C. Rust-Inhibitive Primer (Water Based): MPI #107.

D. Waterborne Galvanized-Metal Primer: MPI #134.

2.6 LATEX PAINTS

A. See paint schedule for specific MPI system number required.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
3. Wood: 15 percent.
4. Gypsum Board: 12 percent.
5. Plaster: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

G. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions.

1. Spray hollow metal and spray and back roll Gypsum Board.
2. Use applicators and techniques suited for paint and substrate indicated.
3. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
4. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:

1. Mechanical Work:
   a. Uninsulated metal piping.
   b. Uninsulated plastic piping.
c. Pipe hangers and supports.
d. Tanks that do not have factory-applied final finishes.
e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

2. Electrical Work:
   a. Switchgear.
   b. Panelboards.
   c. Electrical equipment that is indicated to have a factory-primed finish for field painting.

3.4 FIELD QUALITY CONTROL
A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:
   1. Owner may engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
   2. Testing agency will perform tests for compliance with product requirements.
   3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION
A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.
3.6 INTERIOR PAINTING SCHEDULE

A. CMU Substrates:

1. High-Performance Architectural Latex System: MPI INT 4.2D (MPI 139).
   c. Topcoat: High-performance architectural latex (MPI 139).

B. Gypsum Board Substrates:

   a. Prime Coat: Interior latex primer/sealer at all new gypsum board.
   c. Topcoat: High-performance architectural latex (Gloss Level 3).

C. Wood Substrates:

1. Latex System (Painted Woodwork):
   c. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4), MPI #15.

2. Polyurethane Varnish System MPI INT 6.3K (Refinish Wood Doors):
   c. Topcoat: Varnish, interior, polyurethane, oil modified, satin (MPI Gloss Level 4), MPI #57).

END OF SECTION 09912
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Roller-applied 100% solids, penetrating epoxy primer followed by a 100% solids epoxy basecoat, a broadcast of decorative colored vinyl flakes and sealed with a 100% solids epoxy grout, with urethane topcoat applied for additional chemical and abrasion resistance.

B. This system shall be applied to the prepared substrate(s) in accordance with the manufacturer’s requirements.

1.3 SUBMITTALS

A. Product Data


B. Samples

1. A hard sample of the proposed system shall be submitted to represent the finished floor.

C. Warranty

1. Manufacturer’s standard warranty.
2. Applicator’s standard warranty.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. The manufacturer shall have a minimum of five (5) years’ experience in the production, sales and technical support of polymer-based floor coatings.
2. The applicator shall have a minimum of three (3) years’ documented experience in the application of polymer floor coatings to concrete floors and be approved by the manufacturer.
3. Proposed suppliers’ products shall provide certification that they have nine (9) years’ experience in the production of polymer floor coatings and be required to meet all
provisions of this specification as well as provide evidence for compatibility between components to the satisfaction of the Architect.

B. Packing and Shipping

1. All materials are to be delivered to the job site in the manufacturer’s original packaging. The product code and other identification marks should be clearly marked and visible.

C. Storage and Protection

1. All material is to be stored in a cool, dry place out of the direct sunlight and away from any ignition sources. The applicator should refer to the manufacturer’s literature and Material Safety Data Sheets for more information.
2. Material Safety Data Sheets are to be kept on site and made readily available for all personnel.

1.5 PROJECT CONDITIONS

A. Environmental Requirements:

1. Optimum air and substrate temperature for product application is between 55°F and 95°F. For temperatures outside of this range, consult the manufacturer for product application suggestions.
2. Maintain proper lighting throughout the work environment; the lighting should be comparable to the final lighting level of the space.
3. Store and dispose of any waste in accordance with regulations of local authorities.

B. SAFETY REQUIREMENTS:

1. “No Smoking” signs shall be posted throughout the work area prior to application.
2. Open flames, spark producing tools/items and ignition sources shall be removed from the work area prior to application.
3. Only work-related personnel shall be allowed within the work area.

1.6 WARRANTY

A. COORDINATION

1. The manufacturer offers a full, one-year warranty against defects in materials. Warranties concerning the installation of the material are solely the responsibility of the applicator.
PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Florock Polymer Flooring
   1120 W. Exchange Avenue
   Chicago, IL  60609
   Phone: (773) 376-7132; (800) 356-7625
   Fax: (773) 376-0945
   http://www.florock.net

2.2 MATERIALS

A. Primer
   1. The primer shall be a 100% reactive, epoxy based, penetrating primer that exhibits
      chemical resistance: Floropoxy 4700 Epoxy Primer.

B. Basecoat & Broadcast
   1. The basecoat shall consist of chemical resistant, self-leveling, 100% solids Floropoxy
      System 4805 (pigment this coat to implement the chip color).
   2. Broadcast colored vinyl flakes to achieve the desired appearance. Use Florock
      FlorChips.

C. Grout Coat
   1. Grout with a 100% solids, chemical resistant, clear, Floropoxy 4805.

D. Optional Topcoat
   1. Apply one (1) topcoat of a Florock high performance, color-stable, chemical resistant
      urethane, exhibiting excellent chemical and abrasion resistant properties.

2.3 PROPERTIES

A. The coating system should meet the following physical properties:

   Cured System Properties

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<tr>
<td>Water Absorption, ASTM C413, %</td>
<td>0.2</td>
</tr>
<tr>
<td>Bond Strength, ACI Committee #503, pp. 1139-1141, ASTM D454, psi</td>
<td>&gt; 400</td>
</tr>
<tr>
<td>Abrasion Resistance, Taber Abrader, CS 17 Wheel, 1000 gm load, 1000 cycles, ASTM D4060, mg</td>
<td>38</td>
</tr>
<tr>
<td>Water Resistance, Fed. Test Std. #1141, Method 6011, ASTM D 1308</td>
<td>No Effect</td>
</tr>
<tr>
<td>Salt Water Resistance, Fed. Test Std. #1141, Method 6061, ASTM B117</td>
<td>No Effect</td>
</tr>
<tr>
<td>Boiling Water Resistance (1 hour continuous exposure), ASTM D2571</td>
<td>No Effect</td>
</tr>
<tr>
<td>Gloss, 60 Degrees, ASTM E97</td>
<td>90 +</td>
</tr>
</tbody>
</table>

PART 3 - EXECUTION

3.1 INSPECTION

A. General

1. Examine the areas and conditions where material is to be installed and notify the Architect of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected by the contractor in a manner acceptable to the Architect.

3.2 PREPARATION

A. General

1. Consult the manufacturer’s recommendations for concrete substrate preparation before proceeding.
B. Patching and Joint Preparation

1. Before application, the floor shall be examined for spalls, pits, holes, cracks, non-functional joints, etc. Make all required repairs before application with the suitable, compatible products. For functional or expansion joints, these shall be treated with 100% solids elastomeric resin having a minimum elongation of 150%, Florock System 6500.

C. Concrete Surfaces

1. Remove all fixtures and shot-blast, diamond grind or power scarify as required to obtain clean, open, porous concrete. Remove sufficient material to provide a sound surface, free of laitance, glaze, efflorescence and any bond-inhibiting curing compounds or form release agents. Remove grease, oil and other penetrating contaminants. Repair damaged and deteriorated concrete to acceptable condition; leave surface free of dust, dirt, laitance and efflorescence.

D. Materials

1. Mix components when required and prepare materials according to flooring system manufacturer’s instructions.

3.3 APPLICATION

A. General

1. The system shall be installed in the order described below:

   a. Substrate Preparation i.e., shot-blast, etc.
   b. Priming
   c. Basecoat & Broadcast Applications
   d. Grout coat & Optional Topcoat Applications

2. The surface should be dry prior to application of any of the aforementioned steps. Furthermore, the substrate shall always be kept clean, dry and free of any contaminants.

3. The handling and mixture of any material associated with the installation of the system shall be in accordance with the manufacturer’s recommendations and approved by the Architect.

4. A neat finish with well-defined boundaries and straight edges shall be provided by the applicator.

B. Priming

1. All areas considered for the application shall be primed with the manufacturer’s primer to seal and penetrate the substrate in preparation for applying the basecoat and grout coat.

2. Porous concrete substrates will require additional applications of primer.
C. Basecoat & Broadcast

1. The basecoat shall consist of the manufacturer’s approved pigmented resin and decorative vinyl flakes to resurface the floor, seal the surface and give the floor impact and chemical resistance.

D. Grout Coat and Optional Topcoat

1. The grout coat and optional topcoat shall be consistent with the manufacturer’s recommendations for the system.
2. No traffic or equipment shall be permitted on the floor during the curing period.

3.4 FIELD QUALITY CONTROL

A. Tests & Inspection

1. The following tests shall be performed by the applicator and recorded during application to submit to the Architect:

   a. Temperature During Installation

      1) Air
      2) Substrate
      3) Dew Point

3.5 CLEANING

A. Disposal

1. Properly remove and dispose of any excess materials.
SECTION 15010 - GENERAL MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.

B. Related Sections: Refer to "Electrical Requirements for Mechanical Equipment" Section 15030 in Division 15 for basic electrical requirements for all mechanical equipment. Special and specific electrical requirements are specified within each respective equipment specification section.

1.2 SCOPE OF WORK - GENERAL

A. This section specifies the basic requirements for mechanical installations and includes requirements common to more than one section of Division 15. It expands and supplements the requirements specified in sections of Division 1.

B. The work covered by the Mechanical Sections of the Specifications shall include the furnishing of all materials, labor, transportation, tools, permits, fees, inspections, utilities and incidentals necessary for the complete installation of all mechanical work required in the Contract Drawings.

C. It is the intent of the Contract Documents to provide an installation complete in every respect. In the event that additional details or special construction is required for work indicated or specified under this section of work or work specified in other sections, it shall be the responsibility of the Contractor to provide all material and equipment which is usually furnished with such systems in order to complete the installation, whether mentioned or not.

D. The Contractor shall review all Contract Drawings and Specifications and include in his bid any work specifically as being performed in the mechanical section. The Contractor shall be responsible for all work performed by his subcontractors.

1.3 DEFINITIONS

A. "Provide" shall mean "furnish and install complete and ready for intended use."

B. "Indicated" shall mean "indicated on drawings".

C. "Concealed" shall mean "hidden from sight as in trenches, chases, furred spaces or hung ceilings.

D. "Exposed" shall mean "not concealed", as defined above.

E. "Noted" shall mean "noted on drawings or in specifications".

F. "Contractor" also referred to as "this Contractor" or "the Contractor", shall mean "the Mechanical Contractor".
1.4 CODES AND STANDARDS

A. All mechanical work shall be in strict accordance with the most current edition of the International Building Code (IBC), International Mechanical Code (IMC), Uniform Plumbing Code (UPC), National Fire Protection Association (NFPA), International Fire Code (IFC), National Electrical Code (NEC), Energy Code IECC and ASHRAE-90.1, and all applicable state and local codes, laws and ordinances.

1.5 PERMITS AND FEES

A. The Contractor shall obtain and pay for all required permits and fees necessary to fully complete all work included in the Contract Drawings and Specifications.

1.6 CONSTRUCTION OBSERVATIONS:

A. During the course of construction of this project, the engineer shall visit the project site periodically on an as-needed basis. The construction observation intervals may vary depending on the progress and/or stage of construction and whether piping and/or ductwork, etc., is being placed below grade and/or concealed, surface mounted items, setting of equipment, equipment connections, etc. However, written field questions are encouraged and welcomed throughout the course of construction and shall be answered promptly in writing, to keep the project construction on schedule. The project foreman should have the building plans, construction schedules, etc., affixed in mind, so the mechanical systems being assembled, the setting of equipment, of parts and pieces, related to the project are anticipated, to prevent delays or emergencies.

B. The engineer shall make one (1) final inspection. The contractor shall notify the engineer that the installation is complete, i.e., the systems are operating and have been tested and balanced, and everything is complete and operational, all equipment connections have been made and the owner’s representatives have been trained. At this time the engineer, the contractor, and the owner’s representative shall schedule a time to walk the project for evaluation, and record in writing the items found to be incomplete. The contractor shall make the corrections within one (1) week after this inspection.

C. On extra visits, the contractor shall report to the engineer that all systems are complete, and the project is ready for the owner’s acceptance.

1.7 INTENT AND INTERPRETATION

A. The Drawings and Specifications are intended to supplement each other and any details contained in one and not the other shall be included as if contained in both. Items not specifically mentioned in the specifications or noted on the drawings, but which are obviously necessary to make a complete working installation shall be included.

B. The drawings are partly diagrammatic and do not necessarily show the exact location of all new piping and existing utilities, unless specifically dimensioned.

C. Riser and other diagrams are schematic only and do not necessarily show the physical arrangement of the equipment. They shall not be used for obtaining quantities or lineal runs of piping.
D. All grilles, fixtures or other pieces of equipment shall be centered on windows, wall spaces, or other items, unless specifically dimensioned otherwise.

E. The location of the piping and ductwork shall be checked to determine that it clears all openings and structural members; that it may be properly concealed; and that it clears cabinets, lights and equipment having fixed locations.

F. Mechanical drawings shall serve as the working drawings for this portion of the work but the Contractor shall refer to the Architectural, Structural and Electrical drawings for additional detail affecting the installation of his work. Architectural drawings shall take precedence over the Mechanical drawings if any dimensional discrepancies exist.

G. The approximate location of each item is indicated on the drawings. These drawings are not intended to give complete and exact details in regard to location. Exact locations are to be determined by actual measurements at the building, and will in all cases be subject to the approval of the Architect and he reserves the right to make any reasonable changes in the locations indicated without additional cost.

H. The contractor shall not make a change in a system, system layout, and/or equipment, except he receive written approval or drawing over the signature of the engineer.

1.8 SUBMITTAL OF EQUIPMENT FOR APPROVAL

A. Refer to the Conditions of the Contract (General and Supplementary) and Division 1 General Requirements for submittal definitions, requirements and procedures.

B. SHOP DRAWINGS AND PRODUCT DATA OF EQUIPMENT BEING INSTALLED IN THE PROJECT: After the contract is awarded, but prior to manufacture of installation of any equipment, assemble Shop Drawings, parts lists, Brochures, etc., for the materials and equipment requiring approval for each section of this specification. A brief description of submittal conditions is given below. Refer to identified sections for detailed submittal requirements.

C. Confirm equipment approved for the project.

1. Confirm that the equipment is approved for installation. It must be defined as to name, catalog number or both in the bid documents, which includes the published addendums. If not approved, do not submit.

2. Each unit shall state the name of the equipment manufacturer (name, address, phone, email, etc.) catalog number, size, physical dimensions and weight, energy characteristics (electrical and/or fuel), operating characteristics, materials from which constructed, any special conditions that may apply to the construction of the unit, etc.

3. The equipment must explain and define in detail the components that make-up the unit, so the owner and engineer can determine, define the replaceable parts during the life of the unit.

4. Complete operating instruction, normal maintenance recommendations, start-up procedures, etc.

5. In general, the contractor shall acquaint himself with the equipment to confirm that it can be installed as shown on the plans and from his experience perform the indicated function in the system where installed.
6. In the course of reviewing the shop drawings, the Contractor shall confirm the energy usage (gas, power, air, water, drains, etc.) and determine if these services are available at the equipment characteristics. Namely: confirm voltage, phase, etc., with the electrical contractor. Natural gas available with the plumber, also drains, water (hot and cold) pipe sizes, etc., or if there is discrepancies in the services. If the indicated equipment services are not available, inform the engineer by phone and in writing, also note on the shop drawing. This cooperative effort will correct a problem before the equipment arrives at the job site.

The shop drawings shall also indicate the scheduled delivery dates the equipment will be at the site.

If the contractor foresees any problems with equipment size, weight, delivery, etc., it shall be noted in writing, attached to the shop drawings.

1.9 RECORD DOCUMENTS

A. Contractor shall record differences between mechanical work as installed and as shown in Contract Documents on a set of prints of mechanical drawings to be furnished by Architect. Return these prints to Architect at completion of project. Notations made on drawings shall be neat and legible. Comply with Division 1 General Requirements.

1.10 OPERATION AND MAINTENANCE MANUALS

A. Contractor shall prepare and submit Operation and Maintenance Manuals for mechanical systems provided under this Contract. Comply with Division 1 requirements for procedures and requirements for preparation and submittal of manuals.

B. Manual binder shall have permanent lettering of a contrasting color. Information to be included on the binder is as follows:

C. The front cover shall be lettered as follows:

MECHANICAL
OPERATION AND MAINTENANCE
MANUAL
(PROJECT NAME)
(CITY AND STATE)
(YEAR)

OWNER: (NAME)
ARCHITECT: (NAME)
MECHANICAL ENGINEER: Nielsion Engineering Inc.
GENERAL CONTRACTOR: (NAME)
MECHANICAL CONTRACTOR: (NAME)

The spine shall be lettered as follows:

MECHANICAL O & M MANUAL (Year)
(Project Name)
D. Provide a master index at beginning of Manual showing items included. Use plastic tab indexes for sections of Manual.

E. Cover section shall consist of name, address, and phone number of Project Architect, General Contractor, Mechanical Engineer, Mechanical Contractor and all Mechanical Sub-Contractors.

F. Provide a separate section for each section of the specifications. Provide index for each section listing equipment included. Include all items specified in Sections 15050 through 15900. Provide a list of each type of equipment supplied with the local supplier's name, address and phone number.

G. Include descriptive literature (manufacturer's catalog data) of each manufactured item. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined. Data sheets shall be original. Copies are not acceptable.

H. One (1) copy of the manual shall be submitted for review and approval by the Engineer. After approval, submit three (3) copies of manual to the Owner for approval unless otherwise directed by Division 1 requirements. Information to be included in manual:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.
2. Manufacturer's printed operating procedures to include start-up, break-in, routine and normal operating instructions; regulation, control, stopping shut-down, and emergency instructions; and summer and winter operating instructions.
3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.
5. Schematic control diagrams (as built-status) for each automatic control system. Mark correct operating setting for each control instrument on these diagrams. A second complete set of control diagrams encased in clear plastic laminate shall be furnished.
6. Valve schedule indicating the valve symbol (tag number), valve location by room number and description, valve purpose and system served, and valve size. Provide one corresponding set of full size mechanical prints (as-builts status) showing these valve locations for cross-reference. A second complete set of valve schedules (8-1/2 in x 11 in.) encased in clear plastic laminate and fitted in an aluminum holding frame shall be furnished to the Owner.
8. Test records and certifications.
9. Instruction period checklist.
10. Warranty information.

1.11 OPERATION AND MAINTENANCE INSTRUCTION AND TRAINING

A. The Contractor shall instruct the Owner's Representative(s) in the Operation and Maintenance procedures described in the Operation and Maintenance Manual. Comply with Division 1 requirements.
B. Individuals present shall include Contractors, Subcontractors, and equipment factory representatives. These individuals shall assist in instruction and start-up.

C. Minimum instruction time shall be eight (8) hours unless otherwise specifically noted.

D. All mechanical systems shall be properly functioning prior to instruction period.

E. Contractor shall prepare a checklist of all equipment and systems requiring instruction and maintenance for verification by the Owner's Representative of satisfactory start-up and instruction. A copy of this checklist shall be included in the Operation and Maintenance Manual.

1.12 GUARANTEE

A. Contractor shall guarantee the satisfactory operation of all material and equipment installed under Division 15 and shall repair or replace to the satisfaction of the Owner or Architect, any defective materials, equipment, or workmanship which may show itself within one year from the date of acceptance.

1.13 CLEANING

A. The Contractor shall, at all times, keep the premises free from accumulations of waste material or rubbish.

B. At completion of the job, the Contractor shall remove all tools, scaffolding, and surplus materials.

PART 2 - PRODUCTS

2.1 GENERAL MATERIALS AND EQUIPMENT REQUIREMENTS

A. All materials, in general, shall conform to the requirements of all agencies or publications specified and described in Division 1 of the Contract Specifications.

B. Materials and equipment to be provided shall be the standard catalog products of manufacturers regularly engaged in the manufacture of products conforming to these specifications, and shall essentially duplicate materials and equipment that have been in satisfactory use at least two years.

C. All pipe, fittings, and valves shall be domestic (USA) manufactured.

2.2 LISTED EQUIPMENT

A. The Idaho State Electrical Code requires that all materials, devices, appliances, and equipment, shall be of a type that conforms to applicable standards or be indicated as acceptable by the established standards of the Underwriter's Laboratories, Inc. or other electrical product testing laboratories which are accredited by the department.
B. This statement is being interpreted by the State Electrical Inspector as follows: It is understood that many specialty items such as cast iron boilers, certain items of air handling equipment and other building components are not available with a UL label covering the entire piece of equipment. The State will impose no requirement that an item of equipment be UL labeled unless it is available as a UL labeled items from at least two manufacturers. Electrical components of unlabeled equipment, such as motors, shall be labeled if they are available from at least two manufacturers.

C. If any building component is available with a UL label from at least two manufacturers, an identical or similar unlabeled component shall not be acceptable for installation in the State of Idaho. Should any such component be installed in the State of Idaho, it shall either be inspected and labeled by a UL representative or other authority approved by the State or it shall be replaced with a UL labeled component, before the building will be accepted by the State Electrical Inspector.

D. Consequently, it shall be the sole responsibility of the Contractor (through project suppliers and equipment manufacturers) to purchase and install only equipment bearing the UL label whenever that equipment so labeled is available. The Contractor, (should any equipment be installed without the proper UL label) shall bear the entire cost of correction to the satisfaction of the Idaho State Electrical Inspector.

2.3 SUBSTITUTIONS AND PRODUCT OPTIONS

A. Substitute equipment is encouraged if it is truly an equal to the specified items.

1. The items and/or equipment specified in the contract documents are standard manufacturers items found in suppliers catalogs, except it be indicated as special. The designer has taken time and effort to analyze, evaluate and prove to himself that the specified units will perform the function needed, wherein it is placed. This means the responsibility for the function of the specified equipment rests with the designer, who knows and understands what is to be accomplished.

2. If a supplier and/or the contractor desire to substitute equipment in place of a specified item, he may do so, but he takes upon himself or herself the full responsibility that the substituted equipment will equal all of the performing characteristics, functions, etc., and/or exceed the performance of the specified item. The substitute equipment shall be of such a physical size and weight that it will mount in the designated location without alterations to the building and the structure will carry the load. If for any reason the substitute equipment requires alterations or modification, in any form to the building and/or the structure, the costs shall be paid by the contractor and/or those requesting the substitutions.

3. Those interested in requesting a substitution shall submit a substitution request. The substitution request will be considered if it is at the office of the Engineer eight (8) working days prior to the day of bidding. The request shall include the following:
   a. A statement certifying that the equipment proposed is equal to that specified; that it has the same mechanical operating characteristics, compatible dimensions, weight, electrical characteristics and meets the function and intent of the equipment named in the contract documents
   b. The specification and catalog numbers of the substituted equipment
   c. A pictorial and specification brochure.
4. Because of the short bidding period, (from issuance of drawing to bid date), between the substitution request and the bid date, the designer does not have adequate time to make a full evaluation of substitute equipment. Therefore, those requesting the substitution must accept full responsibility for the items being submitted for substitution (operating characteristics, physical size, weight, output, not increase the load, etc.). If at any time during the course of construction, even up into the final completion, if the designer finds the equipment does not meet the design criteria, comply with the performance, etc., those requesting the substitution and the contractor have the responsibility to remove the substituted equipment and install the specified item at their expense. There shall be no cost assessed to the owner and/or the designer and the replacement will not delay the completion of the project.

D. Discrepancies between equipment specified and the intended function of equipment shall be brought to the attention of the Architect/Engineer in writing prior to bidding. Failure to report any conflict, including catalog numbers, discontinued products, etc., does not relieve the Contractor from meeting the intent of the contract documents, nor shall it change the contract cost. If the Contractor is unable to interpret any part of the plans and/or specifications, or should he find discrepancies therein, he shall bring this to the attention of the Architect/Engineer, who will issue interpretation and/or additional instructions to Bidders before the project is bid.

E. Any conflict arising from the use of substituted equipment shall be the responsibility of the contractor, who shall bear all costs required to make the equipment comply with the intent of the contract documents.

F. Samples may be required for non-standard or substituted items before installation during construction. Provide all samples as required.

G. No materials or apparatus may be substituted after the bid opening except where the equipment specified has been discontinued. This substitution may be made by a change order.

H. Approved equipment shall be so noted, in writing in a formally issued Project Addendum.

PART 3 - EXECUTION

3.1 COORDINATION

A. Each Contractor shall at all times cooperate with other trades on the job to avoid friction and delay to the progress of work. All points in dispute shall be referred to the Architect.

3.2 SUPERVISION

A. This Contractor shall have in charge of the work at all times a thoroughly competent superintendent. Comply with Division 1 requirements.

3.3 WORKMANSHIP

A. The work under the mechanical contract shall be performed by workers skilled in the particular trade and include all work necessary to properly complete the installation in a professional manner so as to present a neat and finished appearance.
3.4 EXAMINATION OF SITE

A. The Contractor shall visit the site of the proposed work and become familiar with the conditions affecting the work. Contractor shall verify all measurements at the building before beginning work.

3.5 SITE UTILITY SERVICES

A. Where applicable, the Contractor shall make connections to existing permanent cold water service immediately so as to provide the use of this service by other trades. Comply with Division 1 requirements.

3.6 EXISTING UTILITIES AND PIPING

A. The locations of existing concealed lines and connection points have been indicated as closely as possible from available information. The Contractor shall assume that such connection points are within a 10-foot (10') radius of the indicated locations. Where connection points are not within this radius, the Contractor shall contact the Architect for a decision before proceeding or may proceed at his own expense.

B. Existing piping (hot and cold water), vent lines, drain lines, roof drains, etc., that are found to obstruct the construction area (walls, floors and ceilings) and obstruct the removal of a wall, doorway or passageway, etc., shall be rerouted and/or relocated to clear the construction. The cost for this work shall be included as a part of the project and shall be covered in the contractor's base bid.

C. If supply and/or return air ducts or exhaust ducts fall within or obstruct construction area for whatever reason, the contractor shall relocate these items to allow construction to proceed. The cost for this work shall be included as a part of the base bid.

D. Existing extensions: piping (water, drain, vent, air, etc.), ductwork, etc., that are noted to be extended and/or retrofit (for whatever reason) to accommodate added and/or new areas or facilities shall accomplish the intent for which the system was designed. When complete, the system and/or systems shall function as if they were new. This work shall be included in the base bid for the project.

Note: The specifications identify each system herein mentioned and the extension and additions shall adhere to the specifications defined for this phase of construction.

3.7 LAYING OUT WORK

A. Locations of equipment and devices, as shown on the drawings, are approximate unless dimensioned. Exact locations of such items shall be determined by the Architect's representative and/or secured from special details and drawings. Verify the physical dimensions of each item of mechanical equipment to fit the available space and promptly notify the Architect/Engineer prior to roughing-in if conflicts appear. Coordination of equipment to the available space and to the access routes through the construction shall be the Contractor's responsibility.
B. The contractor shall hand deliver to the general contractor a written statement and/or a manufacturer’s brochure on the equipment being installed at each location. The information shall give the dimensions and weight (loads) of each unit being installed. The general contractor shall forward a copy of this information to the structural engineer and obtain from him confirmation that the building structure will accommodate the loads. If there be any problem the questioning party shall notify the mechanical engineer by phone and in writing.

3.8 CONTRACTOR COORDINATION

A. In the course of installing the systems defined in the contract documents, the contractor shall closely follow the plans, details and specifications (contract documents). The system design has been a careful and laborious undertaking, with the intent purpose of producing a system and/or systems that will serve the owner well with a minimum of maintenance. Thence, the contractor shall adhere as closely as possible to the plans, details and specifications for each system. Questions and suggestions are encouraged as the project is being assembled. If for any reason, the contractor feels to deviate from the defined information, and finds a way, to improve the system, to make the system more easily assembled, make it operate more efficiently, etc., the contractor shall suggest the change to the engineer. Systems are designed to perform a specific function; the most minute change in assembly may change the function. If the engineer agrees with the change he will authorize the contractor to proceed. Contractor cooperation and coordination is appreciated. If the contractor proceeds on construction without the designer’s authorization, it shall be reworked, in accordance to plans and specifications, which work shall be at the contractor’s expense.

3.9 CUTTING AND PATCHING

A. All cutting and patching of new or existing construction required for installation of mechanical systems and equipment specified in Division 15 shall be the responsibility of the Mechanical Contractor unless otherwise noted. Comply with Division 1 for general requirements for cutting and patching.

B. All cutting shall be performed with masonry saws, core drills or similar equipment to provide neat and uniform openings.

C. All patching shall match adjacent surfaces in materials and finish. Do not endanger or damage installed work through procedures and processes of cutting and patching.

D. Arrange for repairs required to restore other work, because of damage caused as a result of mechanical installations.

E. No additional compensation will be authorized for cutting and patching work that is necessitated by ill-timed, defective, or non-conforming installations.

F. Perform cutting, fitting, and patching of mechanical equipment and materials required to:

1. Uncover work to provide for installation of ill-timed work.
2. Remove and replace defective work.
3. Remove and replace work not conforming to requirements of the Contract Documents.
4. Remove samples of installed work as specified for testing.
5. Install equipment and materials in existing structures.
G. Upon written instructions from the Architect/Engineer, uncover and restore work to provide for Architect/Engineer observation of concealed work.

H. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including, but not limited to removal of mechanical piping, heating units, plumbing fixtures and trim, and other mechanical items made obsolete by the new work.

I. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

J. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

3.10 REPLACEMENT OF PAVING AND CONCRETE

A. All existing or new sidewalks, concrete paving, curbs, or asphalt paving removed or damaged by this Contractor during the period of the installation or as a result thereof, shall be replaced with like material in a manner as directed by and to the satisfaction of the Owner's Representative. Comply with Division 2 General Requirements.

3.11 OPENINGS IN PIPES AND DUCTS

A. All temporary openings in pipes and ducts shall be capped or sealed during construction. Caps shall be removed for final connections.

3.12 PROTECTION OF MATERIALS AND EQUIPMENT

A. Contractor shall be held responsible for any and all materials and equipment to be installed under this contract and will be required to make good at his own cost any injury or damage which materials or equipment may sustain from any source or cause whatsoever before final acceptance. Comply with Division 1 requirements.

3.13 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.

B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.

C. Coordinate deliveries of mechanical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.
3.14 ACCESSIBILITY

A. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.

B. Access doors or hatches required for servicing of mechanical equipment shall be furnished and installed as specified in the other Divisions of the Specifications.

3.15 PAINTING

A. Contractor shall touch-up scratched or damaged factory finishes of mechanical equipment. Comply with Division 1 requirements.

B. Unless otherwise noted, all other painting of mechanically related items shall be according to Division 9, Section 09900 "PAINTING".

3.16 LUBRICATION

A. Contractor shall properly lubricate all pieces of equipment before turning the building over to the Owner. Comply with Division 1 requirements.

3.17 FINAL CLEANING

A. Refer to Division 1 for general requirements for final cleaning.

B. At time of final cleanup, all fixtures and equipment shall be thoroughly cleaned and left in condition for use.

3.18 FIRE PENETRATION SEALS

A. All penetrations through fire rated floors and walls shall be sealed to prevent the spread of smoke, fire, toxic gas or water through the penetration before, during or after a fire. The fire rating of the penetration seal shall be at least that of the floor to wall into which it is installed so that the original fire rating of the floor or wall is maintained.

B. The sealant shall remain soft and pliable to allow for the removal and/or addition of piping without the necessity of drilling holes. It shall adhere to itself to allow any and all repairs to be made with the same material. It shall permit the vibration, expansion and/or contraction of piping and ducts going through the penetration without the seal cracking or crumbling.

C. When damming materials are to be left in place after the seal is complete, all such materials shall be non-flammable.

D. When sealant is injected into a penetration, the foam shall expand to surround all items within the penetration and maintain pressure against the walls of the penetration. The foam shall cure within five minutes and be fire resistant at that time. No heat shall be required to further expand the foam to block the passage of fire and smoke or water.
E. All wall or floor penetration openings shall be as small as possible.

F. The foam sealant shall meet all of the fire test and hose stream test requirements of ASTM E119-73 and shall be UL classified as a Wall Opening Protective Device. The sealant shall be CHASE-FOAM, CTC PR-855 Fire Resistant Foam Sealant from Chase Technology Corporation, Huntington Station, New York 11746 or 3M Brand Fire Barrier caulk CP25, putty 303, wrap/strip FS 195 or sheet CS 195 from 3M Products Divisions, 224-4N 3M Center, St. Paul, MN 55144-1000.

3.19 TESTING, ADJUSTING, AND BALANCING

A. The air distribution systems shall be balanced by a Balancing or Engineering Firm with five years experience in HVAC design and balancing. The report shall be stamped by a licensed engineer and certified by NEBB. The Balancing firm shall furnish the necessary instruments for making tests and performing work. The Mechanical Contractor shall include in his contract all costs including the Balancing Firm's charges.

B. Balancing work shall not be started until such time as the following conditions are completely fulfilled:

1. All systems shall be completely installed and shall have been successfully test run, and fully operational.
2. All outlets, dampers, balancing devices, and accessories shall be completely installed.
3. Filters and strainers shall be clean.
4. All wiring shall be completed, including all interlocks and heaters.
5. Control system shall be completely installed, tested, and all instruments shall be calibrated.
6. Proper fan rotation shall be verified.

C. The Contractor shall furnish the project foreman to aid the Balancing Firm in balancing the system. The foreman shall be in constant attendance and shall make all equipment adjustments as required.

D. The Contractor shall furnish all ladders, scaffolding, and tools required for access and adjustment. High scaffolding will be required in areas with ceiling over 12 ft.

E. The Contractor shall furnish and install all required exchanges of adjustable sheaves and V-belt drives necessary for proper balance of the system to obtain the desired air balancing of systems.

F. The Automatic Controls Subcontractor shall furnish a man, available upon request, to make necessary adjustments in the control system during the balancing.

G. The balancing agency shall submit in quadruplicate on neat and legible forms the full report of systems operation, initial and final readings.

H. All instruments used for measurements shall be accurate and calibration histories for each instrument shall be available for examination. The Mechanical Engineer has the right to request instrument recalibration, or the use of other instruments, where accuracy of readings is questionable.
I. Furnish in the report a written guarantee to be effective for one year from the date of acceptance, to make any and all adjustments required to maintain comfort in all rooms and areas.

J. Air balancing shall include the following:

   1. Set supply and exhaust fans at design speeds and record average amperage readings on all motor phases, static pressures and CFM of air flow in each system.
   2. Read air flows at registers, grilles, and diffusers with a velometer or equal air measuring device. Adjust dampers as required. Outlets shall be adjusted to design CFM plus or minus 10%.
   3. Adjust minimum outside air dampers to design CFM or 10% of supply air total CFM.
   4. Adjust fans as required to meet design. Check for drafts, noise and vibration.
   5. After balancing is complete, mark final position of balancing dampers.
   6. Report any discrepancies immediately to the Mechanical Design Engineer.

K. Upon completion of testing, adjusting and balancing of the air and/or water systems, prepare a complete and legible draft report. Submit two (2) copies of the draft report to the Mechanical Design Engineer for review.

L. Upon verification and approval of the draft reports, prepare final reports. Four (4) typewritten, organized and formatted copies of the final report are required. Furnish one (1) copy to the Mechanical Design Engineer for his record, and the remaining three (3) copies are to be included in the Owner's Operation and Maintenance Manuals.

END OF SECTION 15010
SECTION 15030 - ELECTRICAL PROVISIONS OF MECHANICAL WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.

1.2 SUMMARY

A. This section specifies the basic requirements for electrical components which are an integral part of packaged mechanical equipment. These components include, but are not limited to factory installed motors, starters, and disconnect switches furnished as an integral part of packaged mechanical equipment.

B. Specific electrical requirements (i.e. horsepower and electrical characteristics) for mechanical equipment are specified within the individual equipment specifications or scheduled on the drawings.

C. All magnetic motor starters and disconnect switches not furnished as an integral part of packaged mechanical equipment shall be provided under Division 15 - Mechanical.

D. Wiring from motors of mechanical equipment to disconnect switches or junction boxes, including pushbuttons, pilot lights, interlocks, speed controllers, and similar devices shall be the responsibility of this Contractor under Division 15 where not specifically indicated under Division 16.

E. Wiring of field-mounted float control switches, flow control switches, and similar mechanical/electrical devices provided for mechanical systems, to equipment control panels shall be the responsibility of this Contractor under Division 15 where not specifically indicated under Division 16.

F. Wiring required for Automatic Controls Section 15900 shall be the responsibility of this Contractor under Division 15.

1.3 REFERENCES

A. NEMA Standard MG1: Motors and Generators.

B. NEMA Standard ICS2: Industrial Control Devices, Controllers and Assemblies.


1.4 SUBMITTALS

A. No separate submittal is required. Submit product data for motors, starters, and other electrical components with submittal data required for the equipment for which it serves as required by the individual equipment specification sections.

1.5 QUALITY ASSURANCE

A. All electrical components and materials shall be labeled by an approved testing agency (UL, ETL, CSA, etc.).

PART 2 - PRODUCTS

2.1 MOTORS

A. The following are basic requirements for simple or common motors. For special motors, more detailed and specific requirements are specified in the individual equipment specifications.

1. Torque characteristics shall be sufficient to satisfactorily accelerate the driven loads.
2. Motor sizes shall be large enough so that the driven load will not require the motor to operate in the service factor range.
3. Two-speed motors shall have two separate windings on poly-phase motors.
4. Temperature Rating: Rated for 40°C environment with maximum 50°C temperature rise for continuous duty at full load (Class A insulation). Service Factor: 1.15 for poly-phase motors and 1.35 for single phase motors.

B. Motor Construction: NEMA Standard MG 1, general purpose, continuous duty, Design "B", except "C" where required for high starting torque.

C. Frames: NEMA Standard No. 48 or 54; use driven equipment manufacturer's standards to suit specific application.

D. Bearings: Ball or roller bearings with inner and outer shaft seals; regreaseable, except permanently sealed where motor is normally inaccessible for regular maintenance; designed to resist thrust loading where belt drives or other drives produce lateral or axial thrust in motor; for fractional horsepower, light duty motors, sleeve type bearings are permitted.

E. Enclosure Type: Open drip-proof motors for indoor use where satisfactorily housed or remotely located during operation; guarded drip-proof motors where exposed to contact by employee or building occupants; weather-protected Type I for outdoor use, Type II where not housed.

F. Overload Protection: Built-in thermal overload protection and, where indicated, internal sensing device suitable for signaling and stopping motor at starter.

G. Noise Rating: "Quiet" rating on motors located in occupied spaces of building.
H. Efficiency: "Energy efficient" motors shall have a minimum efficiency as scheduled in accordance with IEEE Standard 112, test method "B". If efficiency not specified, motors shall have a higher efficiency than "average standard industry motors", in accordance with IEEE Standard 112, test method "B".

I. Nameplate: Indicate the full identification of manufacturer, ratings, characteristics, construction, special features, and similar information.

2.2 STARTERS, ELECTRICAL DEVICES, AND WIRING

A. Motor Starter Characteristics: Enclosures NEMA, general purpose enclosures with padlock ears, except in wet location shall be NEMA 3R with conduit hubs. Type and size of starter shall be as recommended by motor manufacturer and the driven equipment manufacturer for applicable protection and startup condition.

B. Manual switches shall have pilot lights and extra positions for multi-speed motors. Overload protection shall be melting alloy type thermal overload relays.

C. Magnetic starters shall have maintained contact pushbuttons and pilot lights, properly arranged for single speed or multi-speed operation as indicated; trip-fee thermal overload relays each phase, interlocks, pneumatic switches and similar devices as required for coordination with control requirements of Division 15 Controls sections, built-in 120 volt control circuit transformer, fused from line side, where service exceeds 240 volts; externally operated manual reset, under-voltage release or protection.

D. Motor connections shall have flexible conduit, except where plug-in electrical cords are specifically indicated.

2.3 CAPACITORS

A. Features shall include individual unit cells, all welded steel housing, each capacitor internally fused, non-flammable synthetic liquid impregnated, craft tissue insulation and aluminum foil electrodes.

B. KVAR size shall be as required to correct motor power factor to 90 percent or better and shall be installed on all motors 1 horsepower or larger, that have an uncorrected power factor of less than 85 percent at rated load.

PART 3 - EXECUTION

(Not Applicable).

END OF SECTION 15030
SECTION 15060 - PIPE AND PIPE FITTINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To -
   1. General piping installation procedures for all piping systems.

B. Related Sections -
   1. General Conditions, Division 01, and Section 15010 apply to this Section.
   2. Type of pipe and fittings specified under each piping system.

1.2 QUALITY ASSURANCE

A. Manufacturer -
   1. Use domestic (USA) made pipe and pipe fittings on Project.

PART 2 - PRODUCTS

2.1 VALVES

A. Valves of same type shall be of same manufacturer.

B. Valves shall be domestic (USA) on this project.

2.2 PIPE HANGERS

A. Adjustable, malleable iron clevis type of a diameter adequate to support pipe size.

B. Approved Manufacturers -
   1. B-Line Systems Fig. B3100
   2. Grinnell No. 260
   3. Kin-Line 455
   4. Superstrut CL-710

2.3 INSULATING COUPLINGS

A. Suitable for at least 175 PSIG WP at 250/F.

B. Approved Manufacturers -
   1. Central Plastics Co
   2. Victualic Co
   3. Watts Regulator Co
2.4 SLEEVES

A. Sleeves shall be standard weight galvanized iron pipe, Schedule 40 PVC, or 14 gauge galvanized sheet metal two sizes larger than pipe or insulation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Furnish and install complete system of piping, valved as indicated or as necessary to completely control entire apparatus. Pipe drawings are diagrammatic and indicate general location and connections. Piping may have to be offset, lowered, or raised as required or directed at site. This does not relieve this Division from responsibility for proper erection of systems of piping in every respect.

B. Properly support piping and make adequate provisions for expansion, contraction, slope, and anchorage.

1. Cut piping accurately for fabrication to measurements established at site and work into place without springing or forcing.
2. Do not use pipe hooks, chains, or perforated metal for pipe support.
3. Remove burr and cutting slag from pipes. All pipe and tube shall be reamed to the full inside diameter of the pipe and tube.
4. Make changes in direction with proper fittings.
5. Insulate hangers for copper pipe from piping by means of at least two layers of Scotch 33 plastic tape.
6. Support piping at 8 feet on center maximum for pipe 1-1/4 inches or larger and 6 feet on center maximum for pipe one inch or less. Provide support at each elbow. Install additional support as required.
7. Suspend piping from roof trusses or clamp to vertical walls using Unistrut and clamps (except underground pipe). Laying of piping on any building member is not allowed.

C. Arrange piping to not interfere with removal of other equipment, ducts, or devices, or block access to doors, windows, or access openings. Provide accessible, ground joint unions in piping at connections to equipment.

D. Make connections of dissimilar metals with insulating couplings.

E. Provide sleeves around pipes passing through floors, walls, partitions, or structural members.

1. Seal sleeves with plastic or other acceptable material.
2. Do not place sleeves around soil, waste, vent, or roof drain lines passing through concrete floors on grade.

F. Cap or plug open ends of pipes and equipment to keep dirt and other foreign materials out of system. Do not use plugs of rags, wool, cotton waste, or similar materials.

G. Install piping systems so they may be easily drained.
H. Grade soil and waste lines within building perimeter ¼ inch fall per ft in direction of flow or as noted on the plans.

I. Insulate water piping buried within building perimeter.

J. Do not use reducing bushings, street elbows, or close nipples.

K. Bury water piping 6 inches minimum below bottom of slab and encase all water lines in PVC or ABS sleeves, a minimum of 2 pipe sizes larger than water line being encased and the insulation installed on this piping. Install 2 inches minimum of sand around the encasement pipe.

END OF SECTION 15060
SECTION 15261 - CULINARY WATER PIPE INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To -
   1. Furnish and install insulation on above ground hot and cold water lines, fittings, valves, and accessories as described in Contract Documents.

B. Related Sections -
   1. General Conditions, Division 01, and Section 15010 apply to this Section.

PART 2 - PRODUCTS

2.1 INSULATION

A. Heavy density pipe insulation with factory vapor jacket equal to Fiberglas ASJ with Butt Joints.

B. Approved Manufacturers -
   1. Manville
   2. Owens-Corning
   3. Knauf

2.2 PVC FITTING, VALVE, & ACCESSORY COVERS

A. Approved Manufacturers -
   1. Knauf
   2. Zeston

PART 3 - EXECUTION

3.1 APPLICATION

A. Piping -
   1. Apply insulation to clean, dry piping with joints tightly butted.
   2. Adhere "factory applied vapor barrier jacket lap" smoothly and securely at longitudinal laps with a white vapor barrier adhesive.
   3. Adhere 3 inch wide self-sealing butt joint strips over end joints.

B. Fittings, Valves, & Accessories -
   1. Insulate with same type and thickness of insulation as pipe, with ends of insulation tucked snugly into throat of fitting and edges adjacent to pipe insulation tufted and tucked in.
2. Cover insulation with one piece fitting cover secured by stapling or taping ends to adjacent pipe covering.

3. Alternate Method -
   a. Insulate fittings, valves, and accessories with one inch of insulating cement and vapor seal with two 1/8 inch wet coats of vapor barrier mastic reinforced with glass fabric extending 2 inches onto adjacent insulation.

C. Pipe Hangers -
   1. Do not allow pipes to come in contact with hangers.
   2. Provide 16 ga x 6 inch long galvanized shields at each pipe hanger to protect pipe insulation from crushing by clevis hanger.

D. No insulation shall be applied until piping has been pressure tested and approved.

E. In all cold attic situations where the building insulation is located at the ceiling, all piping installed in the ceiling to roof space shall be insulated as specified herein. In addition, install at 6" thick by 30" wide fiberglass blanket with vapor barrier (vapor barrier towards warm side of cavity) over the pipe to tent and allow heat loss through the ceiling to prevent the pipe from freezing. The insulation blanket shall be held in place by rolling it to a wood lathe and nailed to the joist. The building insulation shall then be applied over this pipe protection layer.

F. In room installations where excess moisture or humidity will be present, only the polyolefin or elastomeric insulation shall be used.

END OF SECTION 15261
SECTION 15263 - REFRIGERANT PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To -

1. Furnish and install insulation on above ground refrigerant suction piping and fittings, including thermal bulb, from thermal expansion valve as described in Contract Documents.

B. Related Sections -

1. General Conditions, Division 01, and Section 15010 apply to this Section.

PART 2 - PRODUCTS

2.1 FLEXIBLE FOAMED PIPE INSULATION

A. Thickness -

1. ½ inch for one inch outside diameter and smaller pipe.
2. 3/4 inch for 1-1/8 through 2 inch outside diameter pipe.
3. One inch for 2-1/8 inches outside diameter and larger pipe (two layers of ½ inch).
4. One inch sheet for fittings as recommended by Manufacturer.

B. Approved Manufacturers -

1. Armaflex
2. Rubatex
3. CSG "Ultrafoam"
4. IMCOA "ImcoLock"

2.2 JOINT SEALER

A. Approved Manufacturers -

1. Armaflex 520
2. BFG Construction Adhesive #105
3. Therma-Cel 950.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install insulation in snug contact with pipe and in accordance with Manufacturer's recommendations.

B. Stagger joints on layered insulation.
C. Slip insulation on tubing before tubing sections and fittings are assembled keeping slitting of insulation to a minimum.

D. Seal joints in insulation. Use black nylon 1" tie straps every two feet.

E. Insulate flexible pipe connectors.

F. Insulate thermal expansion valves with insulating tape.

G. Insulation exposed outside building shall have "slit" joint seams placed on bottom of pipe.

H. Insulate fittings with sheet insulation and as recommended by Manufacturer.

I. Paint exterior exposed insulation with two coats of white or gray finish recommended by Insulation Manufacturer, except on Therma-Cel insulation.

END OF SECTION 15263
SECTION 15411 - CULINARY WATER PIPING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To -
   1. Furnish and install culinary water piping complete with necessary valves, connections, and accessories inside building and connect with outside utility lines 5 feet from building perimeter.
   2. Perform excavating and backfilling required by work of this Section.

B. Related Sections -
   1. General Conditions, Division 01, and Sections 15010, 15060 and 15190 apply to this Section.
   2. Division 02 - Culinary water piping from 5 feet from building to main.
   3. Division 02 - Criteria for performance of excavation and backfill.

1.2 SUBMITTALS

A. Quality Control -
   1. Submit written report of sterilization test to Architect.

PART 2 - PRODUCTS

2.1 MANUFACTURING

A. All pipe & fittings shall be domestic (USA) manufacturer.

B. All valves shall be domestic (USA) manufacturer.

2.2 PIPE

A. Type K copper for piping underground or beneath concrete slab. 3/4 inch minimum under slabs. Trap primer supplies shall be ½ inch.

B. Type L hard drawn copper for above ground applications.

2.3 FITTINGS

A. Wrought copper.

2.4 CONNECTIONS

A. Sweat copper type with 95/5 or 96/4 Tin-Antimony solder.

B. Joints under slabs, if allowed by local codes, shall be brazed.
2.5 BALL VALVES

A. Use ball valves exclusively unless otherwise specified. Ball valves shall be by single manufacturer from approved list below. Valves shall be for 150 PSI SWP.

B. Approved Manufacturers -

1. Nibco-Scott T595 or S595 or equal by
2. ConBraCo (Apollo)
3. Crane
4. Hammond
5. Stockham
6. Watts

2.6 STOP & WASTE VALVES

A. Approved Manufacturers -

2. Buffalo screw type curb box H-10350 complete with lid and H-10349 enlarged base by Mueller.

2.7 BACKFLOW PROTECTIONS

A. Approved Manufacturers -

1. Watts No. 909 or No. 009AQ - R.P. Backflow Preventer.
2. FEBCO Model No. 825 or Model No. 880 - R.P. Backflow Preventer.
4. ConBraCo.

2.8 COMBINATION PRESSURE REDUCING VALVE/STRAINER

A. Integral stainless steel strainer, or separate 'Y' strainer installed upstream of pressure reducing valve.

B. Built-in thermal expansion bypass check valve.

C. Approved Manufacturers -

1. Watts U5B or equal by
2. Cash Valve
3. Spencer
4. Wilkins

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install piping under slabs without joints where possible.

B. Locate cold water lines a minimum of 6 inches from hot water line.
3.2 FIELD QUALITY CONTROL

A. Before pipes are covered, test systems in presence of Architect at 100 psi hydrostatic pressure for two hours and show no leaks.

B. Sterilize domestic water system with solution containing 250 parts per million minimum of available chlorine. Introduce chlorinating materials into system in manner approved by Architect. Allow sterilization solution to remain for 24 hours and open and close valves and faucets several times during that time.

C. After sterilization, flush solution from system with clean water until residual chlorine content is less than 0.2 parts per million.

D. Water system will not be accepted until negative bacteriological test is made on water taken from system. Repeat dosing as necessary until such negative test is accomplished.

END OF SECTION 15411
SECTION 15412 - SOIL, WASTE, AND VENT PIPING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To -

1. Furnish and install soil, waste, and vent piping systems within building and connect with outside utility lines 5 feet out from building where applicable.
2. Perform excavation and backfill required by work of this Section.

B. Products Furnished But Not Installed Under This Section -

1. Galvanized steel roof jacks.

C. Related Sections -

1. General Conditions, Division 01, and Sections 15010, 15060 and 15190 apply to this Section.
2. Division 02 - Criteria for performance of excavation and backfill.
3. Division 02 - Sewage piping from 5 feet out from building to main.
4. Division 02 - Storm sewer piping.
5. Division 07 - Installing of galvanized steel roof jacks.
6. Division 07 - Furnishing and installing of lead roof jacks.

PART 2 - PRODUCTS

2.1 MANUFACTURING

A. All pipe and fittings shall be domestic (USA) manufacturer.

2.1 BURIED LINES

A. Service weight, single-hub type cast iron soil pipe and fittings meeting the requirements of ASTM A 74, "Specification for Cast Iron Soil Pipe & Fittings". Service weight, no- hub cast iron pipe and fittings meeting the requirements of ASTM A 888, “Specifications for Cast Iron Soil Pipe and Fittings”.

B. Plastic pipe conforming to IAPMO and ASTM specifications will be acceptable where permitted by local code.

C. Joint Material -

1. 50% oakum and 50% lead, well called.
2.2 ABOVE GRADE PIPING & VENT LINES

A. Same as specified for buried lines except no-hub pipe may be used.

B. Vent lines 2-1/2 inches or smaller may be Schedule 40 galvanized steel.

C. Plastic pipe conforming to IAPMO and ASTM specifications will be acceptable where permitted by local codes.

D. Joint Material -
   1. Bell & Spigot Pipe - 50% oakum and 50% lead, well caulked, or rubber gaskets meeting requirements of ASTM C 564, "Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings".

PART 3 - EXECUTION

3.1 INSTALLATION

A. Do not calk threaded work.

B. Slope horizontal pipe at ¼ in/ft.

C. Place cleanouts as follows -
   1. Where shown on Drawings and near bottom of each stack and riser.
   2. At every 90 degree change of direction for horizontal lines.
   3. Every 100 feet of horizontal run.
   4. Extend cleanout to accessible surface. Do not place cleanouts in carpeted floors. In such locations, use wall type cleanouts.

D. Each fixture and appliance discharging water into sanitary sewer or building sewer lines shall have seal trap in connection with complete venting system so gasses pass freely to atmosphere with no pressure or syphon condition on water seal.

E. Vent entire waste system to atmosphere. Discharge 10 inches above roof. Join lines together in fewest practicable number before projecting above roof. Set back vent lines so they will not pierce roof near edge or valley.

F. Use torque wrench to obtain proper tension in cinch bands when using hubless cast iron pipe. Butt ends of pipe against centering flange of coupling.

*** Roof systems other than concrete roof tile ***
G. Flash pipes passing through roof with galvanized base “no-caulk”, roof flashing with flexible rubber waterproof collar. Flashing base shall be at least 18" x 18".

1. Flashing may be 4 lb per sq ft lead flashing fitted around pipes and turned down into pipe ½ inch with turned edge hammered against pipe wall.
2. Consult roofing contractor for exact method of flashing, coordinate with engineer.

3.2 FIELD QUALITY CONTROL

A. Before piping is covered, conduct tests for leaks and defective work. Notify Architect prior to testing. Correct leaks and defective work. Fill waste and vent system to roof level with water, 10 feet minimum, and show no leaks for two hours.

END OF SECTION 15412
SECTION 15440 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To -
   1. Furnish and install plumbing fixtures as described in Contract Documents.

B. Related Sections -
   1. General Conditions, Division 01, and Section 15010 and 15060 apply to this Section.

PART 2 - PRODUCTS

2.1 GENERAL

A. Interior exposed pipe, valves, and fixture trim shall be chrome plated.

2.2 WATER CLOSETS

A. Standard Fixture -
   1. Approved Manufacturers -
      a. American Standard
      b. Kohler

B. Handicap Fixture -
   1. 18 inch rim height.
   2. Approved Manufacturers
      a. American Standard
      b. Kohler

C. Seat -
   1. Provide split front type with check hinge.
   2. Approved Manufacturers for Standard, Handicapped and Nursery Fixtures -
      a. Church
      b. Beneke Corporation
      c. Bemis
      d. Kohler
      e. Olsonite

D. Supply Pipe & Stop -
   1. Provide stuffing box and chrome plated escutcheons
   2. Approved Manufacturers
      a. Eastman
      b. Brass Craft
E. Flush Valves -

1. Approved Manufacturers
   a. Sloan
   b. Zurn

2. Flush Valve Filters
   a. SFOBI “Dirt Grabber” South Fork Manufacturing

F. Water Closet Supports

1. J.R. Smith
2. Zurn
3. Josam
4. Wade
5. Watts Drainage Products

2.3 URINALS

A. Fixture -

1. Approved Manufacturers
   a. American Standard
   b. Kohler

B. Flush Valve -

1. Approved Manufacturers
   a. Sloan
   b. Zurn

2. Flush Valve Filters
   a. SFOBI “Dirt Grabber” South Fork Manufacturing

2.4 LAVATORIES

A. Self-Supporting Fixture –

1. Size 20” x 18”
2. Approved Manufacturers
   a. American Standard
   b. Zurn
   c. Kohler

B. Counter Top Fixture -

1. Size 20” x 17” (maximum)
2. Approved Manufacturers
   a. American Standard
b. Kohler

C. Fittings -

1. Faucet and Drain -
   a. Approved Manufacturers-
      1) American Standard
      2) Moen Commercial
      3) Symmons
      4) Delta Commercial
      5) Kohler
      6) Zurn

2. Supply pipes with stops -
   a. Provide stuffing box and chrome plated escutcheons.
   b. Approved Manufacturers -
      1) Eastman
      2) Brass Craft
      3) Dearborn
      4) Zurn

3. Trap -
   a. 17 ga tube "P" trap, chrome plated
   b. Approved Manufacturers -
      1) Brass-Craft
      2) Dearborn
      3) McGuire
      4) Keeney Manufacturing
      5) Watts

D. All handicap accessible lavatories shall have traps and hot and cold water supplies insulated with flexible vinyl insulation manufactured by Truebro, Inc. Handi Lav-Gaurd Model No. 102W or No. 105W (no equals accepted).

2.5 HANDICAPPED LAVATORIES

A. Self-Supporting Fixture –

1. Size - 20" x 27"
2. Approved Manufacturers –
   a. American-Standard
   b. Kohler

B. Fittings -

1. Faucet & Drain -
   a. Approved Manufacturers -
      1) American Standard
      2) Symmons
      3) Grohe
      4) Moen Commercial
      5) Zurn
2. Supplies with stops
   a. Provide stuffing box, brass stems and chrome plating.
   b. Approved Manufacturers
      1) Eastman
      2) Brass Craft
      3) Dearborn
      4) Zurn

3. Traps
   a. 17 ga tube “P” trap, chrome plated
   b. Approved manufacturers
      1) Watts
      2) Dearborn
      3) McGuire
      4) Keeney Manufacturing

C. All handicap accessible lavatories shall have traps and hot and cold water supplies insulated with flexible vinyl insulation manufactured by Truebro, Inc. Handi Lav-Gaurd Model No. 102W or No. 105W (no equals accepted).

2.6 CLEANOUTS:

A. Furnish wall cleanouts with chrome wall cover and screw.

1. Finish Floors - Wade W-6000
2. Resilient Flooring - Wade W-6000-T
3. Finished Wall - Wade W8460R
4. Exposed Drain Lines - Wade W-8650A
5. General Purpose - Wade W-8550A
6. Approved Alternate Manufacturers for Cleanouts
   a. Josam
   b. Smith
   c. Zurn
   d. Watts Drainage Products

2.7 SHOWERS

A. One piece seamless acrylic/fiberglass approved manufacturers.

1. American Standard
2. Aquatic
3. Kohler

B. Shower valves approved manufacturers.

1. American Standard
2. Bradley
3. Delta Commercial
4. Moen Commercial
5. Kohler
6. Symmons
7. Powers
PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fixtures including traps and accessories with accessible stop or control valve in each hot and cold water branch supply line.

B. Mount fixtures per architectural elevations unless noted otherwise.

C. Make fixture floor connections with approved brand of cast iron floor flange, soldered or caulked securely to waste pipe.

D. Make joints between fixtures and floor flanges tight with approved fixture setting compound or gaskets.

E. Calk between fixtures and wall and floor with white butyl rubber non-absorbent caulking compound. Point edges.

F. All wall hung fixtures shall be securely attached to carriers, fixture hanger or arm shall be supported free of finished wall.

3.2 ADJUSTING, CLEANING

A. Polish chrome finish at completion of Project.

B. Clean sediment from aerators.

END OF SECTION 15440
SECTION 15450 - VIBRATION AND SEISMIC CONTROL FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Quality of and requirements for anchorage and seismic restraint systems and vibration isolation systems for HVAC piping and equipment.

B. Related Sections:

1. Section 03 3111: Cast-In-Place Concrete.
2. Furnishing and installing of seismic restraint and vibration isolation systems is by installer of equipment requiring such systems. Manufacturers of equipment specified for seismic restraint shall provide product data needed for calculation of seismic restraint needs. This information shall include, but not be limited to, equipment dimensions, dimensioned anchor points, operating weight, and center of gravity dimension.

1.2 REFERENCES

A. American Society For Testing And Materials:

1. ASTM A 615-04b, 'Standard Specification for Deformed & Plain Billet-Steel Bars for Concrete Reinforcement.'

B. Sheet Metal & Air Conditioning Contractors National Association / American National Standards Institute:


1.3 SUBMITTALS

A. Product Data:

1. Restraint system and anchorage method to be used for each piece of equipment.
2. Seismic restraints and calculations for all flexible mounted equipment.
3. Vibration isolators and flexible couplings.
4. Clearly outlined procedures for installing and adjusting isolators, seismic bracing anchors, and snubbers.

B. Shop Drawings:

1. Show size, hanger length, and location of seismic restraints for piping and ductwork.
2. Show details for each isolator and seismic brace with snubbers proposed for specified equipment.
3. Show details for proposed structural steel frames and rails and for anchors to be used in conjunction with isolation of equipment.
4. Show locations of piping and ductwork restraints on installation and fabrication floor plans (not bid set of documents of floor plans), noting size and type of restraint to be used.

5. Show details of supports, hangers, anchorage, and bracing for isolated equipment as designed or proposed by professional engineer employed by Restraint Manufacturer and qualified with seismic experience in bracing for mechanical equipment. Shop drawings submitted for seismic bracing and anchors shall bear engineer's signed professional seal.

6. Include anchor bolt calculations, signed and stamped by registered engineer, showing adequacy of bolt sizing and type.
   a. Calculations shall include anchor embedment, minimum edge distance and minimum center distance.
   b. Design lateral forces shall be distributed in proportion to mass distribution of equipment.
   c. Furnish calculations for anchors on restraint devices, cable, isolators, and on rigidly mounted equipment.

1.4 QUALITY ASSURANCE

   A. Regulatory Requirements: System design and installation shall meet seismic requirements as defined in 2000 Edition of International Building Code, Section 1621 and applicable state and local codes in accordance with Seismic Zone 2B with minimum restraint capability of 0.2 g. Explicit requirements and details can be found in referenced SMACNA Manual.

   B. Seismic Requirements: Mechanical equipment, piping, and ductwork shall be braced, snubbed, or supported to withstand seismic disturbances and remain operational.

   C. Vibration Isolation Requirements: Isolate equipment from structure by means of resilient vibration and noise isolators.

PART 2 - PRODUCTS

PROJECT SPECIFIC: Edit materials list below to include only those materials or elements that are actually part of the Mechanical design.

2.1 MATERIALS

   A. Isolation And Seismic Equipment:
      2. Equipment with Fixed Anchor or Support:
         a. Restraint designed according to Sections 1621 and 1622 of International Building Code.
         b. Horizontal force factor for elements of structures:
            1) In addition, vertical force restraint requirement shall be computed at 1/2 value of horizontal forces.
            2) Restrain equipment not anchored directly to floors by cable system designed and furnished by Restraint Manufacturer.
      3. Ductwork: Restrain ductwork in accordance with Figures 4.2 to 4.10 in SMACNA Manual as appropriate.
B. Vibration Isolation Requirements:

1. Unless otherwise noted, isolate HVAC equipment one horsepower and over from structure by means of resilient vibration and noise isolators in accordance with ASHRAE HANDBOOK 2003 - HVAC Applications, Table 42, Chapter 47.

2. Design and install isolation equipment, hangers, connections, and other isolating devices to prevent transmission of vibration to structure from equipment and associated piping and ductwork.

3. For floor-mounted equipment, use recommendations of Table 45.

4. For roofs and floors constructed with open web joints, thin long span slabs, wooden construction and unusual light weight construction, evaluate equipment weighing more than 300 pounds to determine additional deflection of structure caused by equipment weight. Isolator deflection shall be 15 times additional deflection or deflection shown in Table 45, whichever is greater.

5. Under-Equipment Spring Isolators:
   a. Equal to Mason SSLFH earthquake motion restrained spring mounts with freestanding stable steel springs, leveling bolts, corrosion resistant finish, motion limiting design, uplift restraining bolts, and 1/4 inch ribbed neoprene noise stop pad.
   b. Isolators shall accept force in any direction up to 1.0 g without failure, and shall limit movement to 3/4 inch 19 mm in any direction.
   c. Springs shall have 50 percent overload capacity.
   d. Size as required to achieve specified static deflection.
   e. Outer diameter of spring proper shall not be less than 0.8 of spring height when in loaded position.

6. Overhead Support Spring And Rubber Hangers:
   a. Combination spring and neoprene hangers.
   b. Hanger bracket shall have 500 percent overload capability and shall allow up to 15 degree hanger rod misalignment without short-circuiting.
   c. Springs shall have 50 percent overload capacity.
   d. Provide seismic bracing as required.

7. Isolate piping and ductwork in mechanical equipment room and piping and ductwork three supports away or 50 feet from other mechanical equipment, whichever is greater, from structure by means of vibration and noise isolators.
   a. Isolate suspended piping with combination spring and fiberglass hangers in supporting rods.
   b. Support floor-mounted piping directly on spring mounts.

8. Isolate vertical pipe risers from structure using vibration and noise isolating expansion hangers having minimum rated deflection of four times anticipated pipe movement. Enclose in housing for fail-safe equipment.

9. Incorporate flexible connectors in piping adjacent to reciprocating equipment.

10. Incorporate flexible connections in ductwork adjacent to air-moving units.

11. Elastomeric Isolator: Neoprene or high quality synthetic rubber with anti-ozone and anti-oxidant additives.


13. Isolators Exposed To Weather: Cadmium plated and neoprene coated springs.
C. Seismic restraint equipment and resilient isolation devices shall be designed and furnished by single Manufacturer:

D. Type One Acceptable Manufacturers:

4. Equal as approved by Architect before bidding. See Section 01 6000.

2.2 FINISHES

A. Clean and paint steel components. Thoroughly clean structural steel bases of welding slag and prime with zinc-chromate or metal etching primer. Etch and paint hot dipped galvanized steel components.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Isolation Equipment:

1. Mount vibration isolated equipment on rigid steel frames or concrete bases unless Equipment Manufacturer certifies direct attachment capability.
2. Install snubbers with factory set clearances.
3. Piping:
   a. Protect isolated and non-isolated piping 2-1/2 inches inside diameter and larger in all planes by restraints to accommodate thermal movement as well as restrain seismic motions.
   b. Locations shall be as scheduled and include, but not be limited to:
      1) At drops to equipment and at flexible connections.
      2) At 45 degree or greater changes in direction of pipe.
      3) At horizontal runs of pipe 30 feet maximum on center spacing.
      4) Gas piping shall have additional restraints as scheduled.

4. Ductwork
   a. Protect isolated and non-isolated rectangular ductwork 4 sq ft in cross-sectional area and larger in all planes by restraints to accommodate thermal movement as well as restrain seismic motion.
   b. Locations shall be determined by Seismic Restraint Manufacturer and include, but not be limited to:
      1) Horizontal runs of ductwork 30 feet maximum on center spacing.
      2) 45 degree or greater changes in direction of ductwork.
      3) Each end of duct runs and drops of equipment.
      4) Each flexible connection.

B. Vibration Isolation: Install piping and ductwork to prevent transmission of noise and vibration into structure.

END OF SECTION 15450
SECTION 15481 - COMPRESSED AIR SYSTEM

PART 1 - GENERAL

1.1 SECTION SUMMARY

A. Pipe And Pipe Fittings
B. Reciprocating air compressor.
C. Air receiver and accessories.
D. Aftercooler.
E. Refrigerated air dryer.
F. Pressure reducing station.

1.2 RELATED SECTIONS

A. General Conditions Division 01 and Section 15010, 15060 and 15190.

1.3 SUBMITTALS

A. Submit under provisions of Section 15010.
B. Shop Drawings: Indicate piping system schematic with electrical characteristics and connection requirements.
C. Product Data: Provide manufacturers catalog literature with capacity, weight, and electrical characteristics and connection requirements.
D. Manufacturer's Installation Instructions: Indicate hoisting and setting requirements, starting procedures.

1.4 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 15010.
B. Record actual locations of equipment and components. Modify shop drawings to indicate final locations.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Section 15010.
B. Operation Data: Submit for air compressor, air receiver and accessories, after cooler, refrigerated air dryer, and pressure reducing station.
C. Maintenance Data: Submit for air compressor, air receiver and accessories, after cooler, refrigerated air dryer, and pressure reducing station.
1.6 REGULATORY REQUIREMENTS

A. Conform to applicable code for installation of pressure vessels.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of air receiver.

C. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect and handle products to site.

B. Accept air compressors, refrigerated air dryer on site in factory fabricated containers with shipping skids and plastic pipe end protectors in place. Inspect for damage.

C. Protect piping and equipment from weather and construction traffic.

1.8 MAINTENANCE MATERIALS

A. Provide maintenance materials under provision of 15010.

B. Provide two quart containers of compressor oil.

PART 2 - PRODUCTS

2.1 MANUFACTURING

A. All pipe & fittings shall be domestic (USA) manufacturer.

B. All valves shall be domestic (USA) manufacturer.

2.2 PIPE AND PIPE FITTINGS

A. Steel Pipe: ASTM A53 or A120, Schedule 40 black.

1. Fittings: ASME B16.3, malleable iron, or ASTM A234, forged steel welding type.
2. Joints: Threaded or welded to ANSI B31.1, ANSI B31.9 or ASME Sec. 1.

B. Copper Tubing: ASTM B88, Type L hard drawn.

2. Joints: ASTM B32, solder, Grade 95TA.

C. Copper Tubing: ASTM B88, Type L annealed.

2.3  VALVES

A.  Ball Valves

1.  Approved Manufacturers:
    a.  Nibco
    b.  Hammond
    c.  Watts
    d.  Apollo

B.  Swing Check Valves

1.  Approved Manufacturers;
    a.  Nibco
    b.  Hammond
    c.  Watts
    d.  Stockham

C.  Air Outlets

1.  Approved Manufacturers:
    a.  Amflow

2.  Quick Connectors: brass, snap on connector with self-closing valve.

2.4  UNIONS AND COUPLINGS

A.  Unions

1.  Ferrous Pipe:  150 psig malleable iron threaded unions.
2.  Copper Tube and Pipe:  150 psig bronze unions with soldered joints.

B.  Dielectric Connections:  Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

C.  Flexible Connector:  Neoprene with brass threaded connectors.

PART 3 - EXECUTION

3.1  INSTALLATION

A.  Install in accordance with manufacturer's instructions.

B.  Install compressor unit on 4" concrete housekeeping pad with 45 degrees cambered edges.

C.  Install compressor unit on vibration isolators.  Level and bolt in place.

D.  Make air cock and drain connection on horizontal casing.

E.  Install line size ball valve and check valve on compressor discharge.

F.  Install replaceable cartridge type filter silencer of adequate capacity for each compressor.
G. Pipe drain to floor drain.

H. Connect condensate drains to nearest floor drain.

I. Install valved bypass around air dryer. Factory insulate inlet and outlet connections.

J. Install valved drip connection at low points of piping system.

K. Install take offs to outlets from top of main, with shut off valve after take off. Slope take off piping to outlets.

L. Install compressed air couplings, female quick connectors, and pressure gages where outlets are indicated.

M. Install tees instead of elbows at changes in direction of piping. Fit open end of each tee with plug.

N. Identify piping system and components.

3.2 FIELD QUALITY CONTROL

A. Compressed Air Piping Leak Test: Prior to initial operation, clean and test compressed air piping in accordance with ANSI B31.1.

B. Repair or replace compressed air piping as required to eliminate leaks, and retest to demonstrate compliance.

C. Cap (seal) ends of piping when not connected to mechanical equipment.

END OF SECTION 15481
SECTION 15490 - LIQUID PROPANE - SITE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To

1. Perform excavation and backfill required for work of this Section.
2. Furnish and install gas piping and fittings as described in Contract Documents from liquid propane storage tank to main shut off valve at the building.

1.2 REFERENCES

A. American Society for Testing and Materials


1.3 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies - Lay underground pipe in accordance with federal pipeline safety regulations, NFPA 58, and local regulations and specifications.

B. Qualifications

1. Welders shall be certified and bear evidence of certification 30 days before commencing work on project. If there is doubt as to proficiency of welder, Owner’s Representative may require welder to take another test. This shall be done at no cost to the Owner. Certification shall be by Pittsburgh Testing Laboratories and other approved authority.
2. Polyethylene pipe installers shall be properly trained and certified in procedure for joining polyethylene pipe.

1.4 DELIVERY, STORAGE & HANDLING

A. Do not store polyethylene pipe so it is exposed to sunlight.

PART 2 - PRODUCTS

2.1 MANUFACTURING

A. All pipe & fittings shall be domestic (USA) manufacturer.

B. All valves shall be domestic (USA) manufacturer.
2.2 COMPONENTS

A. Above-Ground Pipe & Fittings - Black carbon steel, butt welded, Schedule 40 pipe meeting requirements of ASTM A 53. Welded forged steel fittings meeting requirements of ASTM A 234.

B. Below-Ground Pipe & Fittings - Polyethylene pipe and fittings meeting requirements of ASTM D 2513 with No. 14 coated copper tracer wire.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Excavate and backfill as specified in Earthwork Section with following additional requirements -

1. Runs shall be as close as possible to those shown on Drawings.
2. Excavate to required depth.
3. Bottom of trenches shall be hard. Tamp as required.
4. Remove debris from trench prior to laying of pipe.
5. Do not cut trenches near footings without consulting Architect.
6. Place 4 inches of sand around pipe before trench is backfilled.
7. Bury outside pipe 12 inches minimum below frost line or 18 inches minimum below finish grade, whichever is deeper.
8. Pressure test piping to 60 psig for four (4) hours and show no leaks.
9. Backfill only after pipe lines have been tested, inspected, and approved by the Architect.

B. General installation shall be as specified in Division 15.

1. Steel pipe 2-1/2 inches and larger shall have welded fittings and joints.
2. Provide 2 foot minimum steel pipe between vertical rise of riser and end of polyethylene line if anode-less riser is not used. Use plastic-to-steel transition or compression fitting between end of service line and steel riser. Provide cathodic protection for steel riser or use anode-less riser.
3. Place tracer wire above polyethylene pipe from building to liquid propane bulk tanks.

3.2 CLEANING

A. Remove excess earth from site or place as directed by Architect.

END OF SECTION 15490
SECTION 15631 - RADIANT HEATING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install all materials and perform all labor necessary for the complete installation of a gas-fired, vacuum vented, radiant heating system as shown on plans and specified herein, to provide a complete functional system.

B. Radiant Burner and Reflector Assembly.

C. Gas Piping and Supply System.

D. Vacuum Venting System.

E. Temperature Control System.

PART 2 - PRODUCTS

2.1 RADIANT HEATING SYSTEM

A. General

1. Gas-fired vacuum vented low intensity radiant heating system shall be as manufactured by Ambi-Rad and Co-Ray-Vac.

2. The system shall employ the proper number of firing units as indicated by the drawings. Units must be certified by the American Gas Association under American National Standard for vented radiant heaters.

3. Installation of all equipment and materials shall conform to the practices of good workmanship, in accordance with applicable requirements. The standard combustion chambers, pipe work, gas lines and electrical conduit shall be attached to or suspended from the building structure in a manner suitable to meet standards of durability and safety.

4. The combustion system will be capable of being the combustion condensing type in which the products of combustion are exhausted below the dew point of the moisture in the flue gases (140 - 180°F)

5. The overall system shall consist of (2) sub-systems containing the total of (8) ARC-32 LR btu/hr natural gas basic burner units interconnected with piping as described on the drawings and installation details, together with (2) vacuum pump packages, (2) thermostats, reflectors, hangers, turnbuckles, gas piping, and electrical wiring; and installed according to installation details, diagrams, and prints furnished.

6. Wiring must conform to the National Electrical Code and local ordinances in accordance with diagrams furnished. Reference: Manufacturer Installation Instructions.

7. Gas supply piping must meet local requirements, and be sized in accordance with BTU demand, available pressure, and the total equivalent length of pipe required (fittings included). Connection from supply line to burner unit must be made in accordance with installation details.
B. Radiant Surface

1. The heat exchanger radiant surface formed by the piping or tubing shall have at least 75 square feet of surface for each therm (100,000 BTU) of input per hour firing rate of the system.
2. All piping or tubing shall be 4" o.d. and manifold sections shall be a hot rolled 14 gauge steel tubing and all tailpipe sections to be 16 gauge steel with acid resistant pipe. Porcelain lined tubing.
3. The joining of all tubing shall be made with a stainless steel coupling.

C. Vacuum-Firing Burner

1. Each burner unit shall consist of an integral burner control device installed in a factory furnished standard combustion chamber.
2. Individual gas vacuum-firing burner units shall be of the total premix type where all of the air required for combustion is premixed before combustion actually occurs.
3. Fuel gas flow to each individual gas vacuum-firing burner unit shall be automatically limited to the supply of combustion air present, supplying only the amount of fuel gas for which there is the proper amount of air available for proper combustion. Should the flow of combustion air be impeded, the individual burner or burners so affected shall automatically modulate the fuel gas flow rate downward to match the proportionate air flow rate, thus maintaining the proper fuel gas to air proportion for good combustion.
4. All gas vacuum-firing burner units shall be equipped with a direct spark ignition. The burner shall shut off when the thermostat is satisfied.
5. All combustion air shall pass through a dust and dirt filter insuring that foreign objects will not enter into burner and/or control compartment.
6. Groups of gas vacuum-firing burner units shall be in tandem except for the end burners. The burners shall fire in an atmosphere of the flue products from preceding burners, thus adding heat at strategic points to the by-products within the tubing or pipe and providing a more even heat output.

D. Reflectors

1. Shall be of 22 gauge type 430 polished stainless steel. Note: Aluminum reflectors are not acceptable.
2. Shall be of the ‘Deep-Dish’ design whereas the bottom of the reflector is below the bottom of the piping system. It shall cover entire piping system, including at the combustion chambers, open only at the bottom.

E. Vacuum Pump

1. Vacuum pump shall be manufactured using heavy duty components to protect against condensation from the system.

F. End Vent Assembly

1. Each open end combustion chamber shall have an approved end vent.
2. Reflector in this area shall have an end cap, and be installed according to manufacturer’s installation instructions.
PART 3 - CONTROLS

3.1 TEMPERATURE CONTROL SYSTEM

A. Temperature controls shall be of the electric and electronic type as manufactured by Honeywell, Penn, or approved equal.

B. Equipment furnished in this work that is normally wired before installation shall be furnished completely wired.

C. Representatives of the temperature control sub-contractor shall furnish and install all line voltage interlock and temperature control wiring. All wiring shall comply with NEC, latest safety orders, other codes of jurisdiction, and applicable sections of the electrical specifications.

D. Drawings of temperature control systems are diagrammatic only and any apparatus not shown but required to make the system operative to the complete satisfaction of the Engineer shall be furnished and installed without additional cost.

E. Thermostats shall be mounted 66 inches above finished floor to centerline.

F. Installation: By the sub-contractor of the temperature control system, including control wiring and the following:

   1. Prior to installation, submit diagrams, component data and description of sequence of operation for approval.
   2. After completion of the installation, regulate and adjust all thermostats, control valves, motors, vacuum supply air and other equipment provided under this contract. A representative of the equipment supplier and owner shall be present during final acceptance test and inspection.

PART 4 - EXECUTION

4.1 GENERAL

A. Installation of all equipment and materials shall conform to the practices of good workmanship, in accordance with applicable requirements. The combustion chambers, pipe work, gas lines and electrical conduit shall be attached to or suspended from the building structure in a manner suitable to meet standards of durability and safety.

4.2 CLEARANCES

A. Clearances to combustible materials shall not exceed those outlined and printed on the burner nameplate and on the manufacturer’s specification sheet as measured from the surface of the radiant tubing or pipe.

4.3 STANDARD REFLECTORS

A. Shall be installed on all piping systems and an end cap installed to close reflector system as indicated on the system layout furnished.
4.4 VENTING

A. The system shall vent all products of combustion outdoors by means of the vacuum pump. Vents shall be installed as indicated on the installation details and in accordance with local requirements. The connection between the pump inlet and tailpipe is made with an acoustic boot and clamps provided. The discharge connection is made with a no-hub coupling and 6 inch CPVC pipe.

4.5 PURGE SYSTEM

A. The control system shall be such that there is a pre-purge (before the ignition cycle of the system) of at least 10 air changes of the entire system volume, and a post-purge of a similar magnitude. A factory furnished pre-wired electric control panel shall be installed in accordance with manufacturer’s wiring diagram.

4.6 WARRANTY

A. The parts of the entire system, including controls, shall be warranted for a period of three years from the date of start-up.

END OF SECTION 15631
SECTION 15640 - FLUES

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To -

1. Furnish and install flues as described in Contract Documents.

B. Related Sections -

1. General Conditions, Division 01, and Section 15010 apply to this Section.
2. Division 09 - Painting

PART 2 - PRODUCTS

2.1 FLUES

A. Double wall, prefabricated sectional type ‘B’, of aluminum construction designed to handle combustion products of fuel being used. Provide with inspection cap as required by local code, roof flashing, and clean-out.

1. Height of flue above roof shall be as shown on Drawings unless local code requires it be higher.
2. Size and install flues from furnaces according to local codes except as follows -
   a. No vertical flue shall have an area of less than 12-1/2 sq inches (4 inches round).
   b. In no case shall vent connector from furnace be smaller than outlet collar provided by Manufacturer.
3. Every portion of flue connector shall have rise of one inch per ft minimum from appliance to vertical flue.
4. Length of horizontal flues or flue connectors shall not be longer than 75% of height of vertical flue between point at which horizontal flue enters vertical flue to top of vertical flue. In no case shall horizontal run exceed 15 feet.
5. When two or more flue connections enter common vertical flue, smaller flue connector shall enter at a higher level. Do not enter flue connectors in same horizontal plane.
6. Horizontal flue connectors shall be double wall.
7. Fittings shall be pre-fabricated double wall.
8. Every gas appliance flue shall have a "backdraft preventer" installed at top of flue.

B. Approved Manufacturers -

1. Ameri-Vent
2. Dura-Vent
3. Metalbestos

2.2 VENT CAPS

A. Non-backdraft type for installation on top of flue, aluminum construction.
B. Approved Manufacturers -

1. Ameri-cap
2. Breidert Type L
3. Triangle AFL
4. Acme Mastervent Type MVR.
5. Dura-Vent

END OF SECTION 15640
SECTIO N 15641 - FLUES - (AL29-4C)

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To -
   1. Furnish and install flues as described in Contract Documents.

B. Related Sections -
   1. General Conditions, Division 01, and Section 15010 apply to this Section.
   2. Division 09 - Painting

PART 2 - PRODUCTS

2.1 FLUES

A. Double wall 1” air space, prefabricated sectional flue, of flue: AL29-4C high, corrosion resistant stainless steel; casing: aluminized/stainless steel construction designed to handle combustion products of fuel being used. Provide with inspection cap as required by local code, roof flashing, and clean-out.

   1. Height of flue above roof shall be as shown on Drawings unless local code requires it be higher.
   2. Size and install flues from furnaces according to local codes except as follows -
      a. No vertical flue shall have an area of less than 28.26 sq inches (6 inches round).
      b. In no case shall vent connector from gas appliance be smaller than outlet collar provided by Manufacturer.

   3. Every portion of flue connector shall have rise of 1/4 inch per ft minimum from appliance to vertical flue.
   4. Length of horizontal flues or flue connectors shall not be longer than 75% of height of vertical flue between point at which horizontal flue enters vertical flue to top of vertical flue. In no case shall horizontal run exceed 15 feet.
   5. When two or more flue connections enter common vertical flue, smaller flue connector shall enter at a higher level. Do not enter flue connectors in same horizontal plane.
   6. Neutral or negative pressure installations must slope upward, away from the appliance. Positive pressure systems may slope upward or downward. Always provide for condensate drainage where required.
   7. Fittings shall be pre-fabricated double wall.
   8. Every gas appliance horizontal flue shall have a stainless steel 1/4 inch screen installed at the flue to prevent birds from entering flue.
   9. Vertical roof vents shall have a rain protection cap, vertical drain section, and bird screen.

B. Approved Manufacturers -
   1. Ameri-Vent
2. Dura-Vent
3. Metalbestos

2.2 VENT CAPS

A. Non-backdraft type for installation on top of flue, aluminum construction.

B. Approved Manufacturers -

1. Ameri-cap
2. Breidert Type L
3. Triangle AFL
4. Acme Mastervent Type MVR.
5. Dura-Vent

END OF SECTION 15641
SECTION 15773 – SINGLE ZONE MINI-SPLIT HEAT PUMP SYSTEMS

PART 1 – GENERAL

1.1 SYSTEM DESCRIPTION

The single zone mini-split heat pump system shall be capable of providing heating and cooling in a one-to-one configuration.

1.2 QUALITY ASSURANCE

A. The units shall be tested by a Nationally Recognized Testing Laboratory (NRTL) in accordance with ANSI/UL 1995 – Heating and Cooling Equipment and shall bear the Listed mark.

B. All wiring shall be in accordance with the National Electric Code (NEC).


D. The System shall be rated in accordance to the U.S. Department of Energy (DOE) test procedures.

E. The units and components within bonded for grounding shall meet safety standards for servicing required by Underwriters Laboratories Inc. (UL), in accordance with Standard for Safety UL 1995 Heating and Cooling Equipment.

F. Units shall be Intertek (ETL) certified for the U.S. and Canada.

1.3 DELIVERY, STORAGE, AND HANDLING

Equipment shall be stored and handled according to the manufacturer’s recommendation.

1.4 Approved manufacturers

A. Mitsubishi Electric

B. LG

C. Lennox

PART 2 – WARRANTY

2.1 LIMITED WARRANTY

Warranty commences on the date of initial installation. For the compressors only, parts shall be covered by the manufacturer’s limited warranty for a period of 7 years. Other covered components shall be covered by the manufacturer’s limited warranty for a period of 5 years.
2.2 INSTALLATION REQUIREMENTS

The system shall be installed per manufacturer’s recommendation.

PART 3 – PERFORMANCE

3.1 PERFORMANCE

The system performance shall be rated in accordance with AHRI 210/240-2008 Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment test conditions.

3.2 COOLING OPERATING RANGE

The operating range in the cooling mode shall be \(-22^\circ F – 122^\circ F\).

3.3 HEATING OPERATING RANGE

The operating range in the heating mode shall be \(-22^\circ F – 86^\circ F\).

3.4 REFRIGERANT PIPING

All refrigerant piping shall be installed in accordance with manufacturer’s recommendations. No additional sight glasses or filter/dryers shall be required. All field installed refrigerant piping shall be applied using nitrogen ACR copper tubing and shall be meet ASTM B280.

Fully serviceable brass service valve shall prevent corrosion and provide access to refrigerant system. Flare connection lines shall be located on side of unit cabinet. Shut-off valve and 2-way service valve (with service port) may be accessed to manage refrigerant charge while servicing system. Refrigerant lines shall be individually insulated to prevent sweating and bundled in line set with UV-rated tape.

The system shall be capable of the following refrigerant piping lengths:

1. Maximum line set length: 164 ft
2. Maximum line set elevation from outdoor unit to indoor unit, when outdoor unit is above: 82 ft
3. Maximum line set elevation from outdoor unit to indoor unit, when outdoor unit is below: 82 ft

PART 4 – PRODUCTS

4.1 MLA SINGLE ZONE OUTDOOR UNIT

A. General

1. The MLA single zone outdoor unit shall be factory assembled and pre-wired with all controls necessary for operation.
2. All refrigerant piping lines shall be insulated separately in accordance with the adopted state or local energy code requirements.
3. Outdoor unit sound pressure level for an individual condensing unit module shall not exceed 63 dB(A).
4. The system shall be capable of automatically restarting operation when power is restored after a power failure.
5. The unit shall have a terminal strip furnished for easy wiring connections.
6. The unit shall have an automatically enabled function to defrost the unit when frost build-up is detected. Outdoor and indoor blower operations terminate and status is displayed on the indoor unit panel.
7. The unit shall be equipped with a 4-way interchange reversing valve to implement rapid changes in direction of refrigerant flow to result in quick changeover from heating to cooling and vice versa. Valve operates on pressure differential between outdoor unit and indoor unit.
8. The unit shall be equipped with a base pan heater.

B. Unit Cabinet

1. The outdoor unit cabinet shall be constructed of heavy gauge steel and shall be finished with a weatherproof and corrosion resistant baked enamel finish.
2. The unit shall have access covers for power and control wiring connections.
3. The unit shall have access covers for service valves.
4. The outdoor unit shall utilize a base pan heater to prevent build-up of ice during heating operation.
5. The unit shall feature tabs on base to allow secure mounting to slab.
6. Condensate drain outlets shall be furnished on unit base. Drain shall be field furnished.

C. Fan

1. The outdoor unit direct fan drive moves large air volumes uniformly through entire outdoor coil for high refrigeration capacity.
2. The outdoor unit fan motor shall be powered by an inverter drive capable of 5 steps of fan speed control.
3. An outdoor unit fan guard shall be provided.

D. Condenser Coil

1. The condenser coil shall be manufactured from copper tubes with aluminum fins.
2. A wire grille guard shall be provided.
3. The condenser coil shall be factory coated with a hydrophilic treatment for increased corrosion resistance.

E. Compressor

1. The unit shall have a compressor that features high-efficiency operation.
2. The compressor shall be balanced to reduce vibration and promote quiet operation.
3. The brushless DC motor shall use powerful Neodymium magnets, 15-20 times stronger than the ferrite magnets within conventional AC compressors.
4. The unit shall utilize a compressor crankcase heater to protect against refrigerant migration that can occur during low ambient operation.
F. Controls

1. The system utilizes DC inverter control to provide continuous operation while adjusting capacity according to room temperature. The system’s accurate sensing of heating and cooling loads prevents frequent changes in capacity and ensures efficient, economical operation.

2. The microprocessor shall control the electronic expansion valve. It shall also assist the automatic compressor timed-off protection feature, indoor fan-on delay in heating mode after coil is warm, and 4-way reversing valve.

G. Electrical

1. The power supply to the outdoor unit shall be 208-230 volts, single phase, 60 Hz

H. Refrigerant

1. Refrigerant shall be non-chlorine, ozone friendly R-410A.
2. Each unit shall be pre-charged from the factory with a holding charge. Additional refrigerant shall be added in the field in accordance with manufacturer’s recommendations.
3. Flare refrigerant connection lines shall be located on side of unit cabinet.
4. The unit shall have a fully serviceable brass service valve to prevent corrosion and provide access to refrigerant system. Shut-off valve may be fully shut off while 2-way service valve with port may be accessed to manage refrigerant charge while servicing system.
5. The refrigerant oil shall be VG74 ester oil. Polyolester (POE) shall not be acceptable.

4.2 MWMA WALL-MOUNTED NON-DUCTED INDOOR UNIT

A. General

1. The Lennox MWMA wall-mounted non-ducted indoor unit shall be completely factory assembled and tested. The unit shall include all wiring, piping, electronic expansion valve, and printed circuit boards necessary for operation.
2. The unit shall allow a heating set temperature as low as 46°F to prevent space from freezing.
3. The unit shall have a pre-heat function to delay fan operation until the indoor coil has reached a field-adjustable temperature.
4. The unit will allow compensation for temperature due to installation height and ground height differentials.
5. The unit shall allow use of remote controller temperature sensor rather than indoor unit temperature sensor.
6. The unit will have a turbo mode to allow unit to initially operate at maximum output to reach set temp as quickly as possible.
7. The unit shall utilize a large diameter cross flow fan and evaporator temperature to minimize the sound level by lowering fan speed.
8. The unit shall have a self-cleaning function to allow drying and cleaning of unit interior to prevent mold and bacteria growth.
9. The unit will have a sleep mode to allow a slow increase or decrease in temperature before shutting off after a delay.
10. The unit shall have a low charge detection function to alert the user when refrigerant leakage is detected.
11. The unit will have an intelligent defrost mode that can vary the defrosting time according to the current system state.
12. The unit must allow continuation of operation in the event of a temperature sensor error.
13. The unit must have low ambient cooling in temperatures as low as -22°F.
14. The unit shall allow for restriction to heating operation only.
15. The unit shall restart automatically after power failure after 3 minutes with prior settings.
16. The unit will be paired with a wireless remote controller.
17. The unit must be compatible with primary VRF provider’s product line.
18. The unit shall have a timer that allows the user to automatically turn on or turn off the unit up to 24 hours later.
19. The indoor unit shall include motor-driven louvers and shall support automatic vertical swing functionality.
20. The unit shall include a factory-provided LED readout display and infrared receiver panel. The LED display shall indicate the current operational set point of the indoor unit, operation status, and codes for maintenance and servicing.

B. Unit Cabinet

1. The indoor unit shall be constructed of galvanized steel.
2. The front panel of the unit may be raised for wiring and maintenance accessibility.

C. Fan

1. The fan motor shall be a DC motor capable of operating at 3 fan grades: low, medium, and high.
2. The fan motor shall be thermally protected.

D. Connections

1. The unit shall be equipped with liquid and gas flare fittings for quick and secure piping.
2. The unit shall have refrigerant piping and drainage hose connections on the right and left side.
3. The unit shall offer 3 access points for refrigerant outlet pipes in the right, left, or rear sides.
4. The indoor unit coil shall be rifled copper tubing with hydrophilic coated aluminum fins.
5. The coil shall have a design pressure of 550 psi.

E. Filter

1. The unit shall be equipped with a cold catalyst filter to reduce odors and presence of volatile organic compounds.
2. The unit shall include an easily removable, washable mesh filter.

F. Electrical

1. The power supply to the indoor unit shall be 115 volts, single phase, 60 Hz.

END OF SECTION 15773
SECTION 15869 - EXHAUST FANS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To -
   1. Furnish and install exhaust fans as described in Contract Documents.

B. Related Sections -
   1. General Conditions, Division 01, and Section 15010 apply to this Section.

1.2 QUALITY ASSURANCES

A. Requirements of Regulatory Agencies -
   1. Bear AMCA seal and UL label. PART 2 - PRODUCTS

2.1 CEILING MOUNTED EXHAUST FANS

A. Acoustically insulated housings.

B. Include shatterproof integral back-draft damper with no metal to metal contact.

C. True centrifugal wheels.

D. Entire fan, motor, and wheel assembly shall be easily removable without disturbing housing.

E. Suitably ground motors and mount on rubber-in shear vibration isolators.

F. Provide wall or roof cap, as required.

G. Approved Manufacturers -
   1. Cook-Gemini
   2. Greenheck Sp
   3. Panasonic
   4. Acme

2.2 INLINE FAN

A. Duct mounted supply, exhaust or return fans shall be of the centrifugal, direct driven or belt driven in-line type.

B. The fan housing shall be of the square design, constructed of heavy gauge galvanized steel and shall include square duct mounting collars.
C. Fan construction shall include two removable access panels located perpendicular to the motor mounting panel. The access panels must be of sufficient size to permit easy access to all interior components.

D. The fan wheel shall be centrifugal backward inclined, constructed of aluminum and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. Wheels shall be statically and dynamically balanced.

E. Motors shall be permanently lubricated and carefully matched to the fan loads. Motors shall be readily accessible for maintenance.

F. A NEMA 1 disconnect switch shall be provided as standard. Factory wiring shall be provided from motor to the handy box.

G. All fans shall bear the AMCA Certified Ratings Seal for both sound and air performance.

H. Each fan shall bear a permanently affixed manufacturer’s nameplate containing the model number and individual serial number for future identification.

I. Motors in the airstream shall have fan wheel mounted to motor shaft and support for weight. Motors and drives that are mounted out of the airstream shall provide the following:

1. Drives shall be sized for a minimum of 150% of driven horsepower.
2. Pulleys shall be of the fully machined cast iron type, keyed and securely attached to the wheel and motor shafts.
3. Motor pulleys shall be adjustable for final system balancing.

J. Approved Manufacturers -

1. Acme
2. PennBarry
3. Cook
4. Greenheck
5. Twin City
6. Carnes

PART 3 - EXECUTION

3.1 INSTALLATION

A. Anchor fan units securely to structure or curb.

END OF SECTION 15869
SECTION 15890 - LOW-PRESSURE STEEL DUCTWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To -

1. Furnish and install above-grade ductwork and related items as described in Contract Documents.

B. Related Sections -

1. General Conditions, Division 01, and Section 15010 apply to this Section.
2. Section 15010 - Smoke testing
3. Section 15895 - Underground Ductwork
4. Section 15893 - High Pressure Ductwork
5. Section 15970 - Temperature control damper actuators and actuator linkages

PART 2 - PRODUCTS

2.1 DUCTS


B. Use of aluminum, non-metallic, or round ducts is permitted only when shown on plans.

2.2 DUCT JOINTS

A. Ducts with sides up to and including 36 inches shall be fabricated using SMACNA T-1 and T-3 joints.

2.3 FLEXIBLE EQUIPMENT CONNECTIONS

A. 30 oz closely woven UL approved glass fabric, double coated with neoprene.

B. Fire retardant, waterproof, air-tight, resistant to acids and grease, and withstand constant temperatures of 250° F.

C. Approved Manufacturers -

1. Cain - N-100
2. Duro Dyne - MFN
3. Ventfabrics - Ventglas
2.4 VOLUME DAMPERS

A. In Main Ducts -

1. 16 gauge galvanized steel, opposed blade type with 3/8 inch pins and end bearings. Blades shall have 1/8 inch clearance all around.
2. Damper shall operate within acoustical duct liner.
3. Provide channel spacer equal to thickness of duct liner.
4. Approved Manufacturers -
   a. Air Balance - Model AC-2
   b. Air Control Products - CD-OB
   c. American Warming - VC-2-AA
   d. Greenheck - VCD-1100
   e. Safe-air - Model610
   f. Vent Products - 5100

B. In Sheet Metal Branch Ducts -

1. Extruded aluminum, opposed blade type. When in open position, shall not extend beyond damper frame.
2. Maximum blade length 12 inches.
3. Damper Regulator shall be concealed type with operation from bottom or with 90 degrees miter gear assembly from side.
4. Approved Manufacturers -
   a. Air Control Products - TCD-OB
   b. Air Guide - OB
   c. Air-rite - Model ST-3
   d. Arrow - OBDAF-207
   e. Reliable Metals - OBD-RO
   f. Safe-air - Models BDR, 612
   g. Tuttle & Bailey - A7RDDM
   h. Young - 820-AC

C. Dampers above removable ceiling and in Mechanical Rooms shall have locking quadrant on bottom or side of duct. Otherwise, provide concealed ceiling damper regulator and cover plate.

2.5 MOTORIZED OUTSIDE AIR DAMPERS

A. Damper Blades -

1. 18 gauge galvanized steel or equivalent aluminum with replaceable rubber blade edges, 9 inches wide maximum.
2. End seals shall be flexible metal compression type.
3. Opposed blade type.

B. Make provision for damper actuators and actuator linkages to be mounted external of air flow.

C. Approved Manufacturers & Models -

1. American Warming - VC-2-AAVA
2. Arrow - OBDAF-207
3. Greenheck - VCD-2100
4. Honeywell - D641
5. Johnson - D1300
6. Louvers & Dampers - TSD400
7. Ruskin - CD36 or CD60
8. Vent Products - 5800

2.6 BACKDRAFT DAMPER
   A. Backdraft blades shall be nonmetallic and shall be neoprene coated fiberglass.
   B. Stop shall be galvanized steel screen or expanded metal, ½ inch mesh.
   C. Frame shall be galvanized steel or extruded aluminum alloy.
   D. Approved Models & Manufacturers -
      1. Air Control Products - FBD
      2. American Warming - BD-15
      3. Ruskin - NMS2

2.7 DUCT HANGERS
   A. 1” x 18 gauge galvanized steel straps or steel rods shall comply with UMC and SMACNA or on detailed on drawings, and spaced not more than 8 feet apart. Do not use wire hangers.
   B. Attaching screws to wood trusses shall be 1-1/2 inch No. 10 round head wood screws. Nails not allowed.
   C. Attaching to steel structures shall be C-Clamp.

2.8 DUCT SEALER
   A. Cain - Duct Butter or Butter Tak
   B. Design Polymerics - DP 1010
   C. DSC - Stretch Coat
   D. Duro Dyne - S2
   E. Hardcast - #601 Iron-Grip or Peel-N-Seal Tape
   F. Kingco - 15-325
   G. Mon-Eco - 44-41
   H. Trans-Continental Equipment Co - Multipurpose Duct Sealant
PART 3 - EXECUTION

3.1 INSTALLATION

A. Ducts -

1. Straight and smooth on inside with joints neatly finished unless otherwise directed.
2. Duct panels through 48 inch dimension having acoustic duct liner need not be crossbroken or beaded.
3. Crossbreak unlined ducts and duct panels larger than 48 inch or bead 12 inches on center.
4. Securely anchor ducts to building structure with specified duct hangers attached with screws or C-clamps.
5. Brace and install ducts so they shall be free of vibration under all conditions of operation.
6. Ducts shall not bear on top of structural members.
7. Make duct take-offs to branches, registers, grilles, and diffusers as detailed on Drawings.
8. Ducts shall be large enough to accommodate inside acoustic duct liner. Dimensions shown on Drawings are net clear inside dimensions after duct liner has been installed.
10. Install internal ends of slip joints in direction of flow. Make joints air tight using specified duct sealer.
11. Cover horizontal and longitudinal joints on exterior ducts with two layers of Hardcast tape installed with Hardcast HC-20 adhesive according to Manufacturer's recommendations.
12. Paint ductwork visible through registers, grilles, and diffusers flat black.

B. Install flexible inlet and outlet duct connections to each furnace, fan, fan coil unit, and air handling unit.

3.2 TESTING FOR LEAKAGE:

A. General: After each duct system is completed, test for duct leakage in accordance with SMACNA “High Pressure Duct Standards–3rd Edition, Chapter 10–Testing for Leakage”. Repair leaks and repeat tests until total leakage is less than 1% of system design air flow.
SECTION 15970 - CONTROL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To -

1. Furnish and install automatic temperature control system as described in Contract Documents.
2. Furnish and install conductors and make connections to control devices and equipment. Furnish and install exposed raceway (conduit) in Mechanical Rooms.
3. Calibrate, adjust, and set controls for proper operation, operate systems and be prepared to prove operation of any part of control system. This work is to be completed before pre-final inspection.

B. Related Sections -

1. General Conditions, Division 01, and Section 15010 apply to this Section.
2. Section 15891 - Furnishing and installing of temperature control dampers.
3. Division 16 - Furnishing and installing of raceway (conduit) and junction boxes, including pull wires, for temperature control system except as noted above.
4. Division 16 - Power wiring to magnetic starters, disconnect switches, and motors.
5. Division 16 - Motor starters and disconnect switches, unless integral with packaged equipment.

1.2 SYSTEM DESCRIPTION

A. Design Criteria -

1. Install line and low voltage electrical wiring, raceway (conduit), and boxes in accordance with Division 16 of these Specifications.
2. System controls shall be single manufacturer's products.

1.3 SUBMITTALS

A. Shop Drawings -

1. Provide three copies of shop drawing submittal data for review. See Section 15010 for definitions and procedures.

B. Operation & Maintenance Data -

1. Upon completion of work of this Section and prior to final inspection, provide two copies of "as-built" ATC diagrams, schematics, catalog cuts, maintenance instructions, and written operating sequence for each furnace/fan system to be included in Operation & Maintenance Manual specified in Section 15010.
PART 2 - PRODUCTS

2.1 THERMOSTATS AND DAMPERS

A. Programmable low voltage type provided with automatic change over feature for both heating/cooling and ventilating stages, seven day program with one start and stop per day with three hour override, provisions for damper operators and remote sensor.

B. Thermostats to be horizontally mounted.

C. Approved Thermostat Models
   1. Match existing radiant wall stat.
   2. All others by prior approval.

2.2 CONDUCTORS

A. Color coded and #16 AWG Type TFN or THHN.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Run all wiring in conduit.

B. Mount Room Thermostats 4'6" from floor to bottom of thermostat.

C. Mount damper actuators and actuator linkages external of air flow.

3.2 FIELD QUALITY CONTROL

A. Field Service-
   1. Calibrate, adjust and set controls for proper operation, operate systems and be prepared to prove operation of any part of control system. This work is to be completed before prefinal inspection.

3.3 ADJUSTING, CLEANING

A. Remove unused wire and conduit from site and test system's controls for two days.

END OF SECTION 15970
SECTION 15985 SEQUENCE OF OPERATION

PART 1 - GENERAL

1.1 SYSTEM DESCRIPTION

A. Performance Requirements.

1. Thermostat shall control occupied status of radiant heating system based on thermostat heating set points. Heater shall run continuously in occupied modes and cycle in fan "auto" mode.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION 15985
SECTION 16000 - GENERAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary
      Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION
   A. Includes But Not Limited To -
      1. Provide labor, materials, and equipment necessary for completion of this Division as
         described in Contract Documents.

1.3 QUALITY ASSURANCE
   A. Requirements of Regulatory Agencies -
      1. NEC and local ordinances and regulations shall govern.
   B. Source Quality Control -
      1. Material and equipment provided shall be new, meet standards of NEMA or UL, and bear
         their label wherever standards have been established and label service is available.

1.4 PRIOR APPROVAL
   A. General:
      1. Catalog and manufacturer's numbers are for the purpose of establishing standards of
         quality and types of materials to be used. Products of other manufacturers may be used if
         equal in quality and design in the opinion of the Engineer and are specifically approved by
         the Engineer. All submittals for “or equal” approval shall be made no less than ten days
         prior to bidding.
      2. Any conflict arising from the use of substituted equipment shall be the responsibility of
         the supplier of that equipment. The contractor and his supplier shall bear all costs
         required to make equipment comply with the intent of the plans and specifications.

1.5 SUBMITTALS
   A. Record Drawings:
B. Shop Drawings:
1. Prepare submittal for each item of equipment and attach written approval to each indicating that Architectural Special Provisions has been complied with and that shop drawings are correct.
2. Do not purchase equipment before completion of shop drawing review.
3. Engineer will not review shop drawings before the contractor has reviewed the shop drawings. The contractor shall stamp all drawings with a statement that he has reviewed all shop drawings and that they conform to the intent of the drawings and specifications.

C. Submittals shall contain:
1. The first section of the manual shall contain:
   a. Names, addresses, and telephone numbers of Electrical Engineer, General Contractor, and any other contractors involved.
2. Date of submission and dates of any previous submissions.
3. Project title and number.
5. The names of Contractor, Supplier, and Manufacturer.
6. Identification of the product, with the Specification Section number.
7. Field dimensions, clearly identified as such.
8. Relation to adjacent or critical features of the Work or materials.
9. Applicable standards, such as ASTM or Federal Specification numbers.
11. Identification of revisions on resubmittals.
12. An 8"x3" space for Engineer's and Contractor’s stamps.
13. Contractor stamp, initialed or signed, certifying to review of submittal, verification of products, field measurements and field construction criteria, and coordination of the information within the submittal with requirements of the Work and of the Contract Documents.
14. Submittals shall be furnished on the following equipment:
   a. Overcurrent Protective Devices
   b. Panelboards
   c. Light Fixtures
   d. Switches
   e. Receptacles

D. O & M Manuals:
1. Provide 3 copies of O & M manual with data for all equipment furnished. Submittals shall be furnished on the following equipment:
   a. Overcurrent Protective Devices
   b. Panelboards
   c. Light Fixtures
   d. Switches
   e. Receptacles
2. Provide one copy of contractor’s written warranty in each manual.

1.6 WORKMANSHIP
A. All workmanship shall meet "NECA Standards of Installation".

1.7 FEES AND PERMITS
A. All permits, fees and charges for inspections required by public authorities shall be paid for by the contractor.

PART 2 - PRODUCTS

2.1 MATERIAL
A. Where Manufacturer's names appear, other Manufacturers may be substituted upon obtaining written approval of Architect or Engineer at least 10 days prior to opening of bids.

PART 3 - EXECUTION

3.1 PREPARATION
A. Confirm dimensions, ratings, and specification of equipment to be installed and coordinate these with site dimensions and with other Section.

3.2 EQUIPMENT IDENTIFICATION
A. Properly identify panelboards, convertible circuit breakers in panelboards, motor disconnect switches, starters, other apparatus used for operation of, or control of, circuits, appliances or equipment by means of engraved laminated plastic descriptive nameplates mounted on apparatus using round head brass machine screws, pop rivets and contact cement. Cardholders in any form are not acceptable.
B. All pull boxes and splice boxes shall identify circuits that are inside pull and splice boxes. Label outside of box cover with black ink markers.
C. Label inside of all switch plates and cover plates with panel and circuit numbers.

3.3 EQUIPMENT FINAL CLEANING
A. At completion of project contractor shall clean all panels which includes vacuuming inside of panel and wiping down all panels.
B. Clean all light fixtures and lamps and remove all dirt, dust, fingerprints, packing etc.
3.4 FIELD QUALITY CONTROL

A. Test systems in presence of Engineer and demonstrate equipment as working and operating properly. Rectify defects at no cost to Owner.

END OF SECTION 16000
SECTION 16060 - MOUNTING HEIGHTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Architectural Special Provisions sections, apply to work of this section.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 INSTALLATION

A. Match existing mounting heights in rooms with existing equipment. Unless otherwise indicated, mount center of outlets or boxes at following heights above finish floor-

<table>
<thead>
<tr>
<th>Product</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receptacles</td>
<td>18”</td>
</tr>
<tr>
<td>Switches</td>
<td>4’ 0”</td>
</tr>
<tr>
<td>Distribution Panels</td>
<td>24” above floor min</td>
</tr>
<tr>
<td>Motor Disconnects</td>
<td>5’ 0” to top</td>
</tr>
<tr>
<td>Push Buttons</td>
<td>4’ 0”</td>
</tr>
</tbody>
</table>

B. Refer special conditions to Architect and locate outlet under his direction.

C. Meet ADA requirements where applicable.

END OF SECTION 16060
SECTION 16110 - RACEWAYS

PART 1 - GENERAL

1.1 DESCRIPTION

1.2 Includes But Not Limited To -
   1. Quality of material and installation procedures for all conduit and fittings used on Project, except as excluded below.

1.3 Related Work Specified Elsewhere -
   1. See Sections relating to power and lighting systems for additional requirements.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Conduit -
   1. 3/4 inch unless indicated otherwise and use restricted as indicated by product.
   2. Galvanized rigid steel (Type RMC) -
      a. May be used in all areas.
   3. Schedule 40 Polyvinyl Chloride (PVC) (Type RNC) 3/4 inch minimum -
      a. May be used -
         1) Underground.
         2) In or below concrete.
   4. Flexible Metal Conduit (Type FMC) - 1/2 inch minimum
      a. Use in indoor final connections to -
         1) Mechanical equipment, not to exceed 36 inches.
         2) Recessed fluorescent lighting fixtures, not to exceed 72 inches with ground wire.
         3) FMC shall not be used in wet locations.
   5. Liquid-tight flexible steel conduit (Type LFMC) -
      a. Use in outdoor final connections to mechanical equipment, not to exceed 36 inches.
B. **Fittings -**

1. Compression or set-screw steel housing type for EMT, flexible steel, and liquid-tight flexible steel conduits.
2. **PVC -**
   
   a. PVC fittings shall be PVC type. Use PVC adapters at all boxes.
   
   b. Brush apply PVC cement.
   
   c. All PVC components, (conduit, fittings, cement) shall be from same Manufacturer.

C. **Use of the following is prohibited -**

1. Aluminum conduit.
2. Electrical non-metallic tubing.
3. EMT crimp-on, tap-on, indenter type fittings.
4. Malleable iron or cast set-screw fittings.
5. Spray (aerosol) PVC cement.
6. PVC 90 degree bends.
7. Metalclad cable

---

**PART 3 - EXECUTION**

3.1 **INSTALLATION**

A. Conceal raceways within ceilings, walls and floors except where exposed raceways are specifically permitted.

B. Keep raceway runs a minimum distance of six inches from hot water pipes.

C. Support conduit and boxes in an approved manner by -

1. Expansion shields in concrete or solid masonry.
2. Toggle bolts on hollow masonry units.
3. Wood screws on wood.
4. Metal screws on metal.

D. Secure conduit with approved supports within three feet of every bend, outlet box, junction box, gutter, panel, fitting, etc. Do not space supports further apart than ten feet. MC cable shall be supported and anchored in accordance with the NEC.

E. Cap conduit ends during construction.

F. Clean or replace conduits in which water or foreign matter have accumulated.

G. Install grounding type insulated bushings on each end of conduit 1-1/4 inch and larger.

H. Install grounding conductor in PVC conduit.

I. Bending of PVC shall be by hot box bender and for PVC two inches in diameter and larger,
expanding plugs.

J. Install conduits into the bottom of panels with adequate space between all conduits to install locknuts and bushings.

K. The following are prohibited -

1. Use of wooden plugs inserted in concrete or masonry units as base for fastening conduits, tubing, boxes, cabinets, or other equipment.
2. Installation of conduit or tubing which has been crushed or deformed.
3. Torches for bending PVC conduit.

L. All 90 degree bends in power and communication conduit systems shall be rigid steel conduit. No PVC 90 degree bends from floor slab up to first outlet box allowed.

M. Run conduit under concrete slabs, not encased in slab.

END OF SECTION 16110
SECTION 16120 - WIRE & CABLE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Includes But Not Limited To -

1. All conductors as required to complete project.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Conductors -

1. Copper except where aluminum is allowed to be used.
2. Minimum size shall be No. 12 except where specified otherwise.
3. Conductor size No. 8 and larger shall be stranded.

B. Aluminum conductors may be used for service and feeder conductors. Conductors shall bear the UL marking. Aluminum conductor installation shall meet the following requirements:

1. Aluminum conductor size shall be determined in accordance with the NEC ampacity tables. Aluminum conductor size shall meet the same intent of the design in terms of ampacity and voltage drop as the copper conductors specified for services and feeders. Conduits shall be sized in accordance with the aluminum wire size selected.
2. Splices and terminals shall be made in an approved manner with connectors specially designed and approved for use with aluminum conductors.
3. All conductor ends shall be stripped of insulation being careful to avoid nicking the metal. Approved types of oxide-inhibiting compounds containing abrasive conducting particles shall be applied to the conductor and shall thoroughly penetrate spaces between strands.
4. At lugs in all panels a terminating adaptor shall be installed. Adaptor shall be a Burndy “Hyplug” or equal.
5. Where bolted, pressure—type connectors are used, they shall be of a type specially designed and approved for use with aluminum conductors. They shall be of exact size to fit the conductors and shall be drawn up tight to manufacturer’s recommendations.
6. Where high—compression—type connectors are used, they shall be of a type specially designed and approved for use with aluminum conductors. They shall be of exact size to fit the conductors and shall be drawn up tight to manufacturer’s recommendations.
7. Where connections are made between aluminum and copper (two dissimilar metals), provision shall be made to prevent electrolytic action, and all connectors used for this purpose shall be approved.
8. Conductor size shall be determined in accordance with NEC ampacity tables and shall meet the intent in terms of ampacity and voltage drop.
C. Insulation -
   1. Local codes shall apply.
   2. Conductor size No. 10 and smaller -
      a. Type THWN/THHN. Branch circuit conductors which run through ballast compartments of lighting fixtures shall be code approved for such use.
   3. Conductor Size No. 8 and larger - Type THWN/THHN or XHHW.

D. Steel spring wire connectors or pressure type terminal lugs as specified.
   1. Connectors shall only be used as specified by manufacturer.
   2. Spring type pressure connectors such as "Scotchlock," shall be used for splicing No. 8 and smaller.
   3. Splitbolt and/or lug type connectors such as "Burndy," shall be used for splicing No. 6 and larger.
   4. Crimp on spade or ring tongue lug connectors for connection to terminal boards such as Thomas & Betts, “Sta-Kon,” shall be used.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Install conductors in raceway unless indicated otherwise.

B. Pulling Conductors -
   1. Do not pull conductors into conduit until raceway system is complete and cabinets and outlet boxes are free of foreign matter and moisture.
   2. Do not use heavy mechanical means for pulling conductors.
   3. Only wire pulling lubricant may be used.

C. Conductors shall be routed in panels in a neat and orderly manner with adequate wiring length to route to all breakers. Wiring shall be routed with 90 degree bends into circuit breakers and shall be tied at points to keep wiring neatly dressed.

D. Conductors shall be continuous from outlet to outlet.

E. Make splices for conductors No. 8 and smaller with steel spring wire connections. Splice larger conductors with pressure type terminal lugs.

F. Route circuits at own discretion, however, circuit numbers shall be according to drawings.

G. All circuits shall have separate neutral installed to meet requirements of NEC 210.4 (B).

H. Run conductors of same circuit in same conduit.

I. Run conductors of different voltage system in separate conduits.
J. Color code conductors as follows -

<table>
<thead>
<tr>
<th></th>
<th>240/120V</th>
<th>Single Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Phase A</td>
<td>Black</td>
</tr>
<tr>
<td>2.</td>
<td>Phase B</td>
<td>Red</td>
</tr>
<tr>
<td>3.</td>
<td>Phase C</td>
<td>--</td>
</tr>
<tr>
<td>4.</td>
<td>Neutral</td>
<td>White</td>
</tr>
<tr>
<td>5.</td>
<td>Ground</td>
<td>Green</td>
</tr>
</tbody>
</table>

END OF SECTION 16120
SECTION 16121 - WIRE CONNECTIONS & CONNECTING DEVICES

PART 1 - DESCRIPTION

1.1 INCLUDES BUT NOT LIMITED TO -

A. Furnish and install wiring devices complete with plates as described in Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Switches & Receptacles -

1. Switches and receptacles listed are 15 ampere and switches are single pole. Where three-way, four-way, two pole, or higher ampere switches are required, they shall be of same series as those listed. Devices of a similar type shall be of same Manufacturer.

2. Color shall be same as plate.

3. Approved Manufacturers for Switches -

<table>
<thead>
<tr>
<th></th>
<th>15A Switches</th>
<th>20A Switches</th>
<th>15A Three-Way Switches</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Cooper Wiring Devices</td>
<td>1201</td>
<td>1221</td>
<td>1203</td>
</tr>
<tr>
<td>b. Hubbell</td>
<td>HBL1201</td>
<td>HBL1221</td>
<td>HBL1203</td>
</tr>
<tr>
<td>c. Leviton</td>
<td>1201</td>
<td>1202</td>
<td>1203</td>
</tr>
<tr>
<td>d. Pass &amp; Seymour</td>
<td>15AC-1</td>
<td>20AC-1</td>
<td>15AC-3</td>
</tr>
</tbody>
</table>

4. Approved Manufacturers for Receptacles -

<table>
<thead>
<tr>
<th></th>
<th>15A GFI Receptacles</th>
<th>20A Receptacles</th>
<th>15A Receptacles</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Cooper Wiring Devices</td>
<td>GF15A/XGF15A</td>
<td>5362</td>
<td>5262</td>
</tr>
<tr>
<td>b. Hubbell</td>
<td>GF5262</td>
<td>5362</td>
<td>5262</td>
</tr>
<tr>
<td>c. Leviton</td>
<td>6598</td>
<td>5362</td>
<td>5262</td>
</tr>
<tr>
<td>d. Pass &amp; Seymour</td>
<td>1595-1</td>
<td>5362</td>
<td>5262</td>
</tr>
</tbody>
</table>

B. In Use Weatherproof Receptacles -

1. Approved Manufacturer -

a. Taymac MX3200 Extra Heavy Duty
b. Intermatic WP3110MXD, WP1030MXD, WP1010MXD, WP1010HMXD
c. Engineer approved equal.
PART 3 - EXECUTION (NOT USED)

END OF SECTION 16121
SECTION 16134 - OUTLET BOXES

PART 1 - GENERAL

1.1 DESCRIPTION
   A. Includes But Not Limited To -
      1. Furnish and install outlet boxes at outlet locations described in Contract Documents.

1.2 JOB CONDITIONS
   A. Coordination -
      1. Coordinate location of outlets which are intended to be above or adjacent to millwork.

PART 2 - PRODUCTS

2.1 MATERIAL
   A. Outlet Boxes -
      1. Galvanized steel and correct size and shape.
      2. Provide metal supports and other accessories for installation of each box.
      3. Equip ceiling and bracket fixture boxes with fixture studs where required.
      4. Equip outlets with extensions as required to bring box flush with finish surface.

PART 3 - EXECUTION

3.1 INSTALLATION
   A. Boxes shall be readily accessible and installed with approved cover.
   B. Sectional boxes shall not be used in concrete.
   C. Locate boxes so outlets are not obstructed by pipes, ducts, or other items.
   D. Install outlets flush or not more than 1/4 inch behind finished surface and level and plumb.
   E. Boxes for switches shall generally be located within six inches of door jamb.
   F. Properly center single outlets in each room. Where two or more outlets occur, space them uniformly and in straight lines with each other.
G. All outlets on J-Boxes not used shall have blank covers installed.

END OF SECTION 16134
SECTION 16180 - OVERCURRENT PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 DIVISION 16000 GENERAL APPLIES TO THIS SECTION.

1.2 DESCRIPTION

A. Includes But Not Limited To -

1. Extent of overcurrent protective device work is indicated by project plans and schedules. Overcurrent protective devices specified herein are for installation as individual components in separate enclosures; and for installation as integral components of switchboards and panelboards. See Section 16470, Panelboards.

2. Types of overcurrent protective devices in this section include the following for operation at 600 volts and below:

   a. Molded case circuit breakers.

1.3 QUALITY ASSURANCE

A. Comply with NEC requirements and NEMA and ANSI standards as applicable to construction and installation of overcurrent protective devices.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, provide products of one of the following (main and branch device manufacturer must be same as panelboard and/or switchboard manufacturer):

   1. Cutler Hammer
   2. General Electric
   3. Square D
   4. Siemens

2.2 MOLDED CASE CIRCUIT BREAKERS

A. Provide factory-assembled, molded case circuit breakers for power distribution panelboards and switchboards; and for individual mounting, as indicated. Provide breakers for amperage voltage, and RMS interrupting rating shown, with permanent thermal trip and adjustable instantaneous magnetic trip in each pole. Construct with overcenter, trip free toggle type operating mechanisms with quick-make, quick-break action and positive handle indication. Construct breakers for
mounting and operating in any physical position and in ambient temperature of 40 degrees C. Provide with mechanical screw type removable connector lugs, AL/CU rated.

2.3 MAINTENANCE STOCK, FUSES

A. For types and ratings required, furnish additional fuses, amounting to one unit for every 5 installed units, but not less than two units of each size and type.

PART 3 - EXECUTION

3.1 INSTALLATION OF OVERCURRENT PROTECTIVE DEVICES

A. Install overcurrent protective devices as indicated, in accordance with the manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. Comply with NEC and NEMA standards for installation of overcurrent protective devices.

B. Coordinate with other work as necessary to interface installation of overcurrent protective devices with other work.

C. Set field-adjustable circuit breakers for trip settings as indicated, subsequent to installation of devices.

D. Install fuses in overcurrent protective devices.

E. Field test all ground fault protective devices for proper operation; test to be performed by representative of the manufacturer. Include verification of complete time current trip characteristics.

3.2 FIELD QUALITY CONTROL

A. Prior to energization of overcurrent protective devices, test devices for continuity of circuitry and for short-circuits. Correct malfunctioning units, and then demonstrate compliance with requirements.

END OF SECTION 16180
SECTION 16510 - INTERIOR BUILDING LIGHTING

PART 1 - GENERAL

1.1 DESCRIPTION
A. Includes But Not Limited To -
   1. Furnish and install lighting system as described in Contract Documents complete with lamps.
B. Related Work Specified Elsewhere -
   1. See Section 16050 for general requirements.

1.2 JOB CONDITIONS
A. Coordination -
   1. Coordinate with ceiling layout to obtain symmetrical arrangement of fixtures in acoustical tile ceiling.

PART 2 - PRODUCTS

2.1 MATERIAL
A. Lighting Fixtures -
   1. See Fixture Schedule on Drawings.
   2. All alternate light fixture packages shall be submitted a minimum of 10 days prior to bid for approval.

PART 3 - EXECUTION

3.1 INSTALLATION
A. Do not locate light fixtures in closet or storage areas within 18 inches of shelves. Do not locate fluorescent fixtures within six inches of shelves.
B. Securely fasten fixtures in place in all areas. Fixtures located in secure areas shall be anchored at four corners.
C. Where recessed lighting fixtures are to be installed, provide openings, plaster rings, etc., of exact dimensions for such fixtures to be inserted in openings. Terminate circuits for recessed fixtures
in an extension outlet box near fixture and connect with 1/2 inch flexible conduit in accordance with Contract Documents.

D. Where fluorescent units are shown installed end to end, provide suitable connectors or collars to connect adjoining units to appear as a continuous unit.

E. Each fixture shall be wired with a 72 inch piece of flexible conduit connected to a blank covered junction box located in the accessible ceiling space within 36 inches of the fixture connection point.

F. Do not install fixture lens enclosures or louvers in fixtures until general construction work is complete, including painting.

G. All light fixtures and lamps shall be left clean at the time of substantial completion of the work. It is the responsibility of the electrical contractor for protection and final cleaning of fixtures. If fixtures are dirty at completion of the project, the Contractor shall clean them at no additional cost to the Owner.

3.2 LIGHT FIXTURE ATTACHMENT

A. Light fixtures in ceiling grid shall be mechanically attached to grid per NEC 410-16 (two per fixture unless independently supported).

   1. Pendant-hung fixtures shall be directly supported from structure with 9-gauge wire (or approved alternative).

END OF SECTION 16500
EXTERIOR FOUNDATION WALL

Scale: 1" = 1'-0"

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3/8" EXTERIOR GRADE
BC PLYWOOD.

3 1/2" 22 GA. METAL
STUD AT 24" O.C.

R-15 GLASS FIBER
INSULATION

1x4 WOOD BASE
PAINTED.

METAL STUD TRACK
ATTACH W/ POWDER
DRIVEN FASTENER AT
48" O.C.

6" CONCRETE
SLAB &
REINFORCING
PER PLAN.

COMPACTED BASE,
PER GEOTECH REPORT.

THICKEN SLAB TO 12".

R-15 XPS RIGID
FOUNDATION INSULATION

FOAMED IN PLACE
INSULATION AT ALL
NON-GROUTED CELLS.

8" CMU WALL,
PER PLAN.

(2) #4 HORIZ. CONT.
AT TOP

PER PLAN

TOP OF CONCRETE
WALL TO MATCH
EXISTING.

DAMP PROOFING
MEMBRANE.

6" CONCRETE WALL W/
#4 AT 16" O.C. VERT.
#4 AT 12" O.C. HORIZ.

TOP OF FOOTING TO
MATCH EXISTING (36" MIN.
BELOW FINISHED GRADE).

FOOTING SIZE AND
REINFORCING PER PLAN.

COMPACTED BASE,
PER GEOTECH REPORT.

ALTERNATE BENDS
EXISTING CMU PILASTER & WALL TO BE REMOVED.

COLUMN & BASE PLATE PER PLAN.

EXISTING CMU PILASTER & WALL TO BE REMOVED.

EXISTING PIER TO REMAIN 8" ABOVE SLAB.

EXISTING FOUNDATION WALL TO BE REMOVED—DOWN 5" BELOW SLAB, TYPICAL EACH SIDE OF COLUMN PIER.

CONCRETE SLAB & REINFORCING PER PLAN.

COMPACTED BASE, PER GEOTECH REPORT

SHADED AREA INDICATES PORTION OF EXISTING FOUNDATION WALL TO REMAIN.

EXISTING FOOTING TO REMAIN

ELEVATION OF NEW COLUMN AT EXISTING PIER

Scale: 1" = 1'-0"

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REVISIONS:

PROJECT 18.111

DRAWN

DATE: JUNE 2015

SHEET 301

18111_301
NEW COLUMN PIER

Scale: 1" = 1'-0"

16"x16"x44" DEEP PIER WITH
(4) #5 VERTS. &
(3) #3 TIES IN TOP 5' &
THEN #3 TIES AT 8" O.C.

4x4 DF#2 POST W/
SIMPSON ABU44 W/
5/8" Øx5" EMBED SIMPSON
TITEN HD. PRIME &
PAINT (2) FINISH COATS.

3/4" CHAMFER,
ALL SIDES

TURNDOWN EDGE
AT SLAB
PERIMETER

PER PLAN
TOP OF CONCRETE
WALL TO MATCH
EXISTING.

CONCRETE SLAB PER
PLAN.

COMPACTED BASE, PER
GEOTECH REPORT.

COMPACTED BASE, PER
GEOTECH REPORT.
NOTE:
PROVIDE CONTROL JOINT AT MID-LENGTH OF WALL.

METAL STUD WALL
550S162-43 AT 24" O.C.
W/ (2) LAYERS 5/8" FIRE RATED GYPSUM WALL BOARD, EACH SIDE.

550T150-43 TRACK WITH
1/2" x 7" EMBED ANCHOR
BOLTS AT 48" O.C.

8" CONCRETE WALL WITH
#5 AT 16" O.C. VERT.
#4 AT 12" O.C. HORIZ.

6" CONCRETE SLAB &
REINFORCING PER PLAN.

#4 HORIZ. AT 36" O.C.

COMPACTED BASE, PER
GEOTECH REPORT.

(2) #5 HORIZ. CONT.
ALTERNATE BENDS.

COMPACTED BASE, PER
GEOTECH REPORT.

FOUNDATION AT 2-HR. FIRE BARRIER

Scale: 1" = 1'-0"
FOUNDATION WALL AT DOOR OPENING

Scale: 1" = 1'-0"

REVISIONS:

PROJECT: 18.111

DRAWN: TTT

DATE: JUNE 2018

SHEET: 304

18111_304
TURN DOWN FOOTING

Scale: 1" = 1'-0"

CONCRETE SLAB PER PLAN
TOOLED EDGE
VERIFY FINISH GRADE

SLOPE 1.5%

6"
ELEVATION OF NEW COLUMN AT EXISTING FOUNDATION WALL

SHARED AREA INDICATES FOUNDATION WALL TO REMAIN.
EXISTING FOOTING & FOUNDATION WALL TO REMAIN.
EXISTING FOUNDATION WALL TO BE REMOVED.
PORTION OF EXISTING CMU WALL TO REMAIN.
PORTION OF THE CMU WALL TO BE REMOVED.
3'-9" WIDE X FULL HEIGHT CMU WALL TO REMAIN.
EXPOSING THE CMU WALL TO BE REMOVED.
COLUMN & BASE PLATE PLATES PER PLAN.

3'-9" DRYPACK.

EXPOSED CMU CEMENT WHERE CMU WALL WAS SAMCUT & REMOVED.
FULL HEIGHT OF WALL BEING REMOVED.
FULL HEIGHT OF SLAB BEING REMOVED.
CRANE BEAM TO COLUMN

Scale: 1" = 1'-0"

EXISTING BOLTS IN SLOTTED HOLES (5 3/4" GAGE).

1/4"

EXISTING CMU PILASTER TO BE REMOVED.

3/4"

NEW COLUMN PER PLAN.

1/4"

SLICE COLUMN TO ACCEPT EXISTING BASE PLATE.

3 SIDES

1/4"

DOUBLE 2x8 TOP PLATE TO REMAIN, VERIFY.

3 1/2"

VERIFY

EXISTING PLATE 3/4"x12"x1'-0" TO REMAIN.

1/4"

4x6 DF#1 (SHAPED) BLOCKING.

BEAM PER PLAN.

PLATE 3/4"x5"x9" W/ (6) 3/4" D. HSB.

1/4"

1/2"

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PROJECT

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DATE

JUNE 2018

502

1811_502
4x6 DF#1 (SHAPED) BLOCKING.

EXISTING 2x8 DOUBLE TOP PLATE TO REMAIN, VERIFY.

3/8" BOLT AT 12" O.C.

BEAM PER PLAN.

PLATE 3/8"x6 1/2"x9"
W/ (6) 3/8" HSB.

PLATE 3/8"x8"x1'-0"
W/ (4) 3/8" HSB.

EXISTING CRANE BEAM
(S15x42.9 + C10x15.3 FLAT) TO REMAIN.

COLUMN PER PLAN.

SLICE COLUMN TO ACCEPT EXISTING BASE PLATE.

---

BEAM COLUMN CONNECTION

Scale: 1" = 1'-0"

A

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PROJECT: 18.111
DRAWN: JRT
DATE: JUNE 2018
SHEET: 503

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BEAM AT END COLUMN

Scale: 1/2" = 1'-0"

PLATE 5/8" x 6" x 1'-0"
W/ (4) 3/8" HSB.

COLUMN PER PLAN.

BEAM PER PLAN.

3/8" PLATE WEB STIFFENER.
EDGE NAILING.

2x6 RIM BOARD NOTCH AT OUTLOCKER FRAMING.

(2) 2x6 FASCIA BOARD.

24 GA. PRE-FINISHED METAL FASCIA.

2x12 RIPPED.

BEAM PER PLAN
PRIME & PAINT (2)
FINISH COATS, SEE SPECIFICATION.

24 GA. PRE-FINISHED METAL SOFFIT PANEL.

2x4 OUTLOCKER AT 24" O.C.

STANDING SEAM METAL ROOF FINISH, PER SPECIFICATION.

SELF-ADHERING UNDERLAYMENT, PER SPECIFICATION.

SHEATHING, PER PLAN.

RAFTER PER PLAN.

SIMPSON LU24 HANGER.

SIMPSON H2.5 AT EACH RAFTER.

24 GA. PRE-FINISHED METAL SOFFIT PANEL.

COLUMN CAP PER PLAN.

COLUMN PER PLAN
PRIME & PAINT (2)
FINISH COATS, SEE SPECIFICATION.

BEAM TO POST AT RAKE

Scale: 1 1/2" = 1'-0"
ROOF RAFTER PER PLAN WITH SIMPSON H2.5.

2x8 TOP PLATE WITH 5/8" x 7" EMBED ANCHOR BOLT 24" O.C.

8" CMU WALL, PER PLAN.

SIMPSON THA418 HANGER.

24 GA. PRE-FINISHED METAL SOFFIT PANEL.

BEAM PER PLAN PRIME & PAINT (2) FINISH COATS.

(2) 16d AT 20" O.C.

13/4" x 1 1/2" L.V. RIM BOARD.

FOAMED IN PLACE INSULATION AT ALL NON-GROUTED CELLS.

EDGE NAILING.

STANDING SEAM METAL ROOF, PER SPECIFICATIONS.

SELF ADHERED UNDERLAYMENT PER SPECIFICATION.

SHEATHING PER PLAN.

R-38 GLASS FIBER INSULATION WITH VENTILATION BATTLES.

ROOF RAFTER PER PLAN.

5/16" GYPSUM BOARD.

2x4" BLOCKING AT 24" O.C. TO ATTACH METAL STUD

5/8" EXTERIOR GRADE BC PLYWOOD PAINTED.

VAPOR BARRIER.

3 1/2" 22 GA. METAL STUD AT 24" O.C.

R-15 GLASS FIBER INSULATION

BEAM TO WALL AT CANOPY

Scale: 1 1/2" = 1'-0"
2-HR. FIRE BARRIER TO ROOF AT NEW ADDITION

Scale: 1 1/2" = 1'-0"
SLIP CONNECTION PER 8/S0.3
ATTACH TOP TRACK TO UNDERSIDE OF EXISTING PURLINS WITH (2) #10x1/2" SELF TAPPING SCREWS AT EACH PURLIN.

EXISTING 2x6 PURLINS TO REMAIN.

FIRE RATED GYPSUM WALL BOARD TO EXTEND TO UNDERSIDE OF ROOF DECK. NOTCH TIGHT AROUND ALL EXISTING PURLINS.

55OS162-43 METAL STUDS AT 24" O.C.

NEW 2x4 NAILERS.

EXISTING ROOF TRUSS, TO REMAIN.

CUT EXISTING 2x4 STRIPPING AS REQUIRED FOR NEW 2-HR. FIRE BARRIER.

5/8" GYPSUM BOARD.

(2) LAYERS 5/8" FIRE RATED GYPSUM BOARD, EACH SIDE OF WALL.

2-HR. FIRE BARRIER AT EXISTING ROOF

Scale: 1 1/2" = 1'-0"
EXISTING 2x6 PURLINS TO REMAIN.

NEW 2x6 OUTLOOKER (LAID FLAT) AT 24" O.C. SISTRED TO EXISTING PURLINS--OUTLOOKER SPANS FROM TOP OF EXISTING TRUSS TO FASCIA BOARD.

2x6 FASCIA BOARD

EXISTING 2x FRAMING, NOTCH AT OUTLOOKER FRAMING.

EXISTING ROOF TRUSS, TO REMAIN.

EXISTING ENDWALL FRAMING TO REMAIN.

EXISTING METAL PANEL TO REMAIN.

EXISTING 2x8 TOP PLATE TO REMAIN.

EXISTING 5/8" GYPSUM BOARD TO REMAIN.

EXISTING 8" CMU WALL TO REMAIN.

STANDING SEAM METAL ROOF, PER SPECIFICATION.

SELF ADHERED UNDERLAYMENT, PER SPECIFICATION.

NEW STRUCTURAL SHEATHING PER PLAN.

EDGE NAILING.

TRIM EXISTING METAL PANEL AS REQUIRED.

2A
7/08

Scale: 1 1/2" = 1'-0"
Canopy rafters to existing

Scale: 1 1/2" = 1'-0"

Existing CMU wall, to remain.

Simpson GA1 at each block with (4) SD#19 x 1 1/2" screws.

Existing roof rafter, to remain.

Standing seam metal roof, per specification.

Self-adhering underlayment, per specification.

Sheathing, per plan.

Edge nailing.

4x8 DF#1 (shaped) blocking.

Existing 2x8 top plate to remain, verify.

Sloped LSU26 hanger.

Roof rafter per plan.

24 ga. pre-finished metal soffit panel.
AT EACH LVL EAVE BLOCKING CUT (4)
2"x2" "V" NOTCHES AS SHOWN FOR
REQUIRED ATTIC VENTILATION.

STANDING SEAM METAL ROOF,
PER SPECIFICATION.

SELF-ADHERING UNDERLAYMENT,
PER SPECIFICATION.

STRUCTURAL SHEATHING PER PLAN.

INSULATION BAFFLE TO
ALLOW AIR FLOW BEHIND.

2x4 DEG. OUTRIGGER AT 24° 0'.

24 G.A. PRE-FINISHED METAL
SOFFIT PANEL.

ROOF RAFTER PER PLAN, BEYOND.

5/8" GYPSUM BOARD, BEYOND.

TYPICAL HEEL BLOCKING

Scale: 1/2" = 1'-0"
LUBE REEL RACK ATTACHMENT TO ROOF

Scale: 1" = 1'-0"

(2) #10x2½" SIMPSON SD
SCREWS AT 8 RAFTERS AT
2 LOCATIONS EACH, DRILL
½" # PILOT HOLES.

(2) NEW 2x6's AS SHOWN
TO ANCHOR EXISTING LUBE
REEL RACK. ATTACH
DIRECTLY TO ROOF
RAFTERS.

FIELD VERIFY
LUBE REEL RACK ATTACHMENT TO ROOF

Scale: 1" = 1'-0"

(2) #10x2½" SIMPSON SD SCREWS AT 8 RAFTERS AT 2 LOCATIONS EACH, DRILL ⅞" Ø PILOT HOLES.

(2) NEW 2x6's AS SHOWN TO ANCHOR EXISTING LUBE REEL RACK. ATTACH DIRECTLY TO ROOF RAFTERS.

PROVIDE ADDITIONAL ROOF RAFTERS AS SHOWN FOR LUBE REEL ATTACHMENT, SEE PLAN FOR LOCATION.
EAVE FASCIA DETAIL

STANDING SEAM METAL ROOF, PER SPECIFICATION.

SELF-ADHERING UNDERLayment, PER SPECIFICATION.

SHEATHING, PER PLAN.

LOW FIXED CLIP

FASTeners PER ROOFING MFR’S REQUIREMENTS

TRI-BEAD TAPE SEALER

CONTINUOUS 3/8” PLYWOOD SPACER

24 GA. PRE-FINISHED METAL DRIP ANCHOR TOP AT 6” O.C. WITH GALV. ROOFING NAILS

CONT. PRE-FINISHED CLEAT ANCHORED 12” O.C.

24 GA. PRE-FINISHED METAL FASCIA.
ANCHOR TOP W/ GALV. ROOFING NAILS AT 12” O.C. EXERCISE CARE NOT TO DIMPLE FACE. PROVIDE MITERED CORNERS AT SIDES. ANCHOR BOTTOM WITH CONT. CLIP ANCHORED AT 12” O.C., LAP 10”-0” LENGTHS 2”. DO NOT NAIL THROUGH BOTH PIECES. APPLY A THIN, SMOOTH LAYER OF SEALANT. DO NOT ALLOW SEALANT TO BLEED OUT OF SEAM. SEALANT COLOR TO MATCH COLOR OF METAL FASCIA

1"-Ø"

24 GA. PRE-FINISHED CONTINUOUS VENTED METAL SOFFIT PANEL.

24 GA. PRE-FINISHED METAL SOFFIT PANEL.

CONT. PRE-FINISHED CLEAT ANCHORED 12” O.C.

Scale: 3" = 1'-0"
EAVE FASCIA AT CANOPY DETAIL

Scale: 3" = 1'-0"

24 GA. PRE-FINISHED METAL FASCIA.
ANCHOR TOP W/ GALV. ROOFING NAILS AT
12" O.C. EXERCISE CARE NOT TO Dimple
FACE. PROVIDE MITERED CORNERS AT SIDES.
ANCHOR BOTTOM WITH CONT. CLIP ANCHORED
AT 12" O.C., LAP 10'-0" LENGTHS 2", DO
NOT NAIL THROUGH BOTH PIECES. APPLY A
THIN, SMOOTH LAYER OF SEALANT. DO NOT
ALLOW SEALANT TO BLEED OUT OF SEAM.
SEALANT COLOR TO MATCH COLOR OF METAL
FASCIA
RAKE FASCIA AT EXISTING DETAIL

Scale: 3" = 1'-0"

STANDING SEAM METAL ROOF, PER SPECIFICATION.
SELF-ADHERING UNDERLAYER, PER SPECIFICATION.
SHEATHING, PER PLAN.
FASTENERS PER ROOFING MFR'S REQUIREMENTS

24 GA. PRE-FINISHED METAL DRIP, ANCHOR TOP AT 6" O.C. WITH GALV. ROOFING NAILS

24 GA. PRE-FINISHED METAL FASCIA, ANCHOR TOP W/ GALV. ROOFING NAILS AT 12" O.C. EXERCISE CARE NOT TO IMPACT FACE. PROVIDE MITERED CORNERS AT SIDES. ANCHOR BOTTOM WITH CONT. CLIP ANCHORED AT 12" O.C., LAP 10'-0" LENGTHS 2", DO NOT NAIL THROUGH BOTH PIECES, APPLY A THIN, SMOOTH LAYER OF SEALANT. DO NOT ALLOW SEALANT TO BLEED OUT OF SEAM. SEALANT COLOR TO MATCH COLOR OF METAL FASCIA

CONT. PRE-FINISHED CLEAT ANCHORED 12" O.C.

24 GA. PRE-FINISHED METAL SOFFIT PANEL
NEW RIDGE DETAIL (FLOATING)

Scale: 1 1/2” = 1'0"

RIDGE FLASHING, LAY SECTION AND APPLY CAULK FULL JOINT

1/4-1/4 x 7/8 LONG-LIFE LAPTEK WITH WASHER AT 6” O.C.

GLASS FIBER WEATHER FILTER FABRIC (ASHRAE STD. 52-66 WITH RESISTANCE OF .06 MS AT 500 FPM). AQUAKOOL BY AMERICAN EXCELSIOR CO. OR EQUAL

12-14 x 1 SELF-DRILLER (1 PER RID)

TRI-BEAD TAPE SEALER

LOW FLOATING CLIP

1/8x3/8 POP RIVET AT 4” O.C.

EXISTING 2x6 PURLING.

STANDING SEAM METAL ROOF, PER SPECIFICATION.

SELF-ADHERING UNDERLAYERMENT, PER SPECIFICATION.

SHEATHING PER PLAN.

EXISTING ROOF TRUSS.
NEW ROOF FINISH OVER EXISTING ROOF TRUSS

Scale: 1" = 1'-0"

EXISTING 2x6 PURLINS
AT 24" O.C., TO
REMAIN, TYPICAL.

EXISTING ROOF TRUSS, TO REMAIN.

NEW 2x6 BLOCKING BETWEEN ALL
EXISTING 2x6 PURLINS CENTERED
ABOVE EACH TRUSS, TYPICAL AT
ENTIRE EXISTING BUILDING ROOF.

STANDING SEAM METAL ROOF, PER
SPECIFICATION.

SELF-ADHERING UNDERLAYMENT,
PER SPECIFICATION.

NEW SHEATHING
PER PLAN.
SHIM AS REQUIRED.
CMU BLOCK. SEE PLAN.
3\(\frac{3}{4}\) METAL STUDS. SEE PLAN.
GLASS FIBER INSULATION. SEE PLAN.
EXTERIOR GRADE 3/8" BC PLYWOOD. PAINT

LINE OF SILL BELOW.
SEALANT AND BACKER ROD
VINYL WINDOW PER PLAN
CAULK ALL AROUND
WINDOW SILL
EXTERIOR GRADE 3/8" B.C. PLYWOOD REVEAL PAINT

WINDOW JAMB/HEAD DETAIL
SCALE: 3" = 1'-0"

HUTCHISON SMITH ARCHITECTS
270 North 27th St. Boise, ID. 83702 (208) 338-1212 FAX (208) 338-0011 hsaarchitects.com
SHIM AS REQUIRED.

SEALANT AND BACKER ROD

VINYL WINDOW PER PLAN

CAULK ALL AROUND

1x WOOD WINDOW SILL WITH BASED EDGE AS SHOWN.
PAINT

EXTERIOR GRADE 3/8" B.C. PLYWOOD, PAINT

3 1/2" METAL STUDS, SEE PLAN.

GLASS FIBER INSULATION, SEE PLAN.

SILL TO MATCH EXISTING.

CMU BLOCK, SEE PLAN.

WINDOW SILL DETAIL

SCALE: 3" = 1'-0"
NOTE:
LIGHTLY SAND SURFACES,
APPLY PRIMER & 2 FINISH COATS

EXTERIOR PAINT DETAIL

Scale: 1/8" = 1'-0"

HUTCHISON
SMITH
ARCHITECTS